

Chat Bot - An Edge to Customer Insight

Mahendra Prasad Nath, Kanika Goyal, Jugesh Prasad, Bhavya Kallur

VMware Software India Pvt. Ltd., Bengaluru, Karnataka 560076, India

Abstract— In this fast-moving era, are you facing a problem with providing response instantly for any simple query to your customer? Is your customer/client/business unsatisfied with turnaround time for their resolution or a response? Anyone who has tried to contact a company through a representative at a call center knows how slow and frustrating the process is.

New developments in technology have opened doors to a faster, easier solution: CHATBOT.

It's a robot which simulates human conversation to automate the kind of tasks you would usually do manually. This is not limited to answering a simple query related to a product, but can be extended to a complex predictive analysis with limited response time.

Creating your own chat bot is no longer reserved only for crazy engineers but even non-technical people can create their own bot. This can be configured and integrated to any messengers that are easily available within an organization or social network. Not to forget about the security of the confidential data, security can be put up at every level to restrict illegal usage of data.

Keywords- Chat Bot, Artificial Intelligence(AI), Natural Language Processing(NLP), Service Registry

I. INTRODUCTION

An Interested customer wants to know more about a certain company products. He will try to call the customer care, or surf some sites to get the information, which is very time consuming and he may not get all the required information that he is looking for. Another case where an internal business person is trying to reach IT by any channel like raising an incident/ticket for a technical issue that he might be facing. Since all this is manual effort by customer/customer facing business team and the resolution/response is also dependent on human interaction and reaction, the turnaround time is subject to conditions. In this fast pace world, customer might get impatient with the wastage of time. An instant response tool which simulates human interaction by a computer program, can be a time savior and a helping hand named CHATBOT, which is a chatting mechanism like chatting with human. A chat bot is nothing more than a computer program which helps to maintain a simple conversation with a user/person/client. It helps us save time, allows focusing on those parts of our jobs that are really of benefit: understanding the business issues, designing powerful consumer insights and bringing those to life.

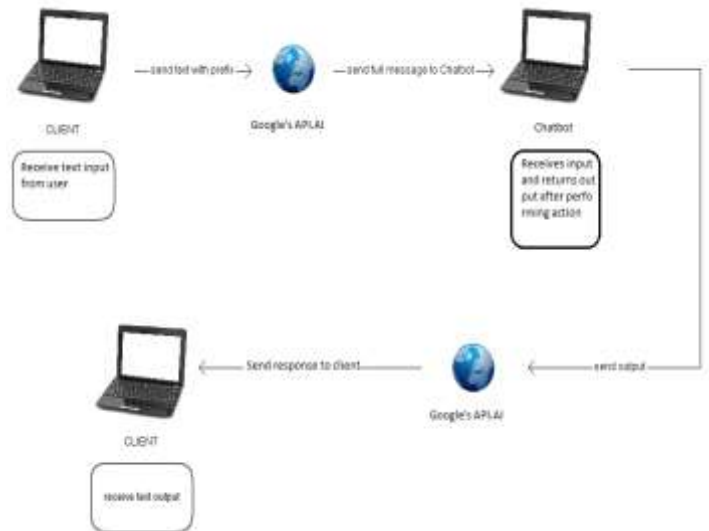


Figure 1: Generic Bot Diagram

The above diagram shows general Chat Bot. First of all, user sends a input message which is in text format. This input message will be received by Google's API.AI. Now Google's API.AI is known as dialougeflow.com. Then the text message will be transferred to CHAT BOT for processing further. After processing the input text of user, CHAT BOT sends the response to Google's API.AI. Then Google's API.AI sends output response to user.

In this paper, we will cover high level implementation and architecture of CHATBOT.

II. IMPLEMENTATION AND ARCHITECTURE

Architecture and Implementation is made easy by the available open sources NLPs (Natural Language Processing) and messengers that are available in the industry.

NLP is the main component which analyses text allowing machines to understand how human' speak. In our implementation, we have used API.AI as the NLP and Skype for Business as the messenger.

A messaging server musts interact with the API.AI (available open source NLPs) to decide what action must be taken. Once the action is selected, it calls respective java service from the registry which in turn calls the desired application to get the response.

Natural Language Processing (NLP) helps to describe a machine's ability to ingest user's input, breaks it down to

required format for comprehending its meaning, determine appropriate action to be taken, and then respond back to the user with appropriate language that user will be able to understand. NLP is the part of Machine Learning layer in CHATBOT. [5]

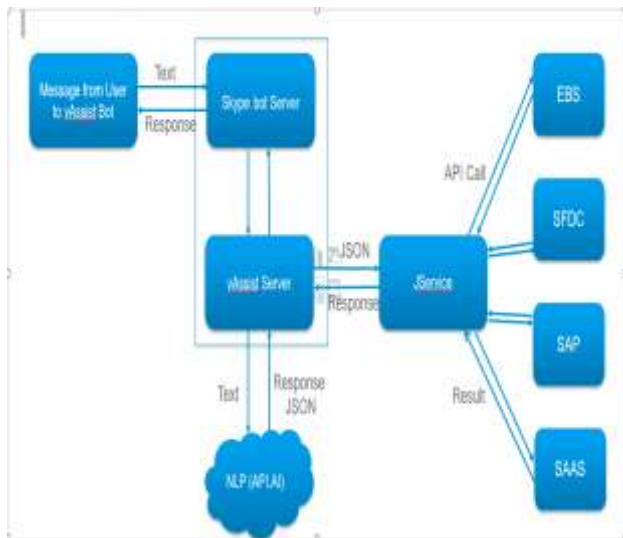


Figure 2: Technical Architecture Diagram

A. *Components of Chatbot architecture:*

1. Messenger (Client)
2. API.AI (NLP)
3. Java Service
4. APIs from respective applications.

In the above technical architecture diagram, vAssist acts as service registry. service registry simply works as a phonebook. It lets clients/end-users to look up different services by their logical names. There a number of service registry available now-a-days. But out of all those service registries, Netflix’s Eureka, Apache Zookeeper and HashiCorp Consul are more popular. Spring Cloud’s Discovery Client abstraction provides a convenient client-side API implementation for working with service registries.

A big benefit of using a service registry is client-side load balancing. Client-side load balancing lets the client pick from among the registered instances of a given service.

Netflix provides a great client-side load balancer called Ribbon. Spring Cloud readily integrates Ribbon, and it is automatically in play at all layers of the framework, whether you’re using the Rest Template, declarative REST clients powered by Netflix’s Feign, or the Zuul microproxy.

Messenger (Client):

Messenger can be any company wide messenger or a social messenger like Skype for business, Facebook, Slack etc.

Components of Messenger (Skype for Business):

We are using Skype for Business as messenger and below is the high-level architecture of the same.

1. Skype Server
2. Application server
3. Windows Service

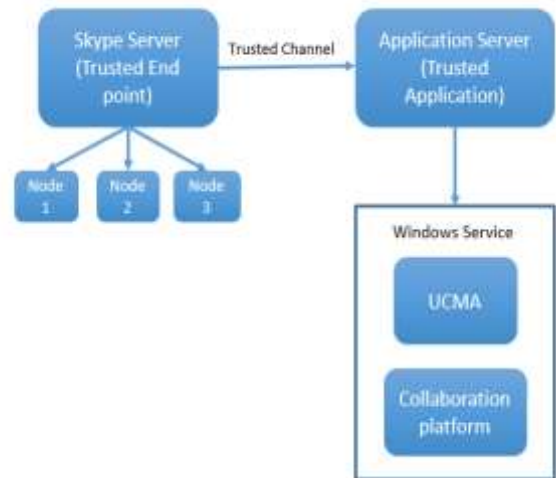


Figure 3: Skype server Architecture Diagram

Skype Server:

A trusted end point has to be created on skype server and it can reside on multiple nodes.

Application Server:

A Trusted application has to be created and mounted on application server. A trusted channel is to be established between end point and application to keep the data in sync.

Windows Service:

Windows service comprises of UCMA and Collaboration Platform.

1. UCMA is a skype plug in to enable Chatbot.
2. Collaboration platform is used to maintain the status of the application user as Online always.

Links given in references section can be used for skype for business implementation.

API.AI (Dialogflow.com)

API.AI is a platform for building conversational interfaces for bots, applications, and devices. This provides input and output methods and responds to actionable data. An optional web hook can be implemented to connect to web service. Your web service can then perform business logic, call external APIs, or access data stores.

API.AI receives a query as input data. A query is either text in natural language or an event name sent to API.AI. API.AI transforms the query text into **actionable data** and returns output data as a JSON response object. The process of transforming natural language into actionable data is called Natural Language Understanding (NLU).

Terminology in API.AI(Dialogueflow.com)

1. *Intents:*

An intent represents a mapping between what a user says and what action should be taken by your software.

Intent interfaces have the following sections:

- User says
- Action
- Response
- Contexts

2. *Action:*

An action corresponds to the step your application will take after identifying the intent based on user input.

3. *Parameters:*

Parameters can be identified as the input values extracted from the user text, for the action.

4. *Context:*

Context is used to make system remember topic of conversation in order to link multiple intents.

Each intent can be linked with other using input and output contexts.

5. *Agents:*

Grouping of different context and intents. Allows you to set language, time zone, theme and other settings for your bot.

Talent Manager (vAssist)

Talent manager talks to API.AI to get the output json that is generated with all the information related to the question user has asked along with intent, context, parameters and transforms into more readable format. It maintains the registry with a list of Java Services for various applications. After reading the intent it calls appropriate java services according to the mapping for further action.

This also receives the output from the java service and passes it to the messenger as a response to the user via API.AI.

The Talent manager setup can be skipped and messenger can directly interact with API.AI to call the java service, however, having the repository of java services in internal layer ensures data integrity.

_Java Service:

The java service determines which application to call based on the intent and the inputs that are received from API.AI. Each application can have a different JS and can be configured to be called accordingly. It reads the received json file and parses the values to route it to the appropriate API. This also reads the output that the application API sends and returns it to the messenger.

Application Layer:

Code residing on the application layer performs the task and returns a response to the java service.

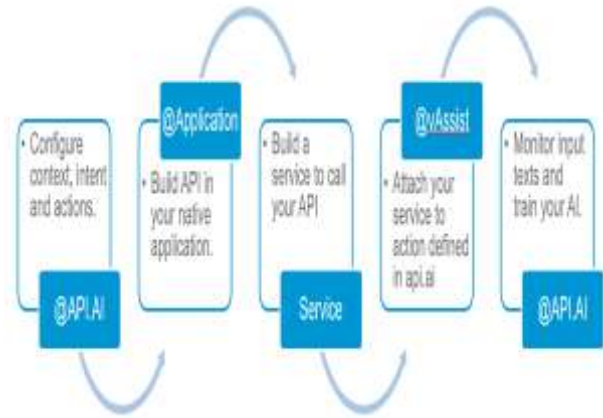


Figure 4: Steps for implementation

III. SECURITY

Security can be maintained at multiple levels.

1. Messenger level – Messenger access is restricted to the employees within an organization. Thus, refraining from any outside contact to access the data by pingng bot.
2. Team Level - Security can be at talent manager to restrict the exposure of data across teams within an organization or at different hierarchical roles within the same team.
3. Application Level – Security can be maintained at the application that is actually interacting to provide the response. Depending on the application (DB/SAAS) different methods of security can be applied. For Example, in an Oracle ERP access can be restricted. based on the responsibilities that user is assigned.
4. Enhance productivity and operational effectiveness.
5. Innovative customer service.
6. Customer satisfaction.
7. Faster turnaround time.
8. Resources reallocation on value added tasks.

IV. BENEFITS OF CHAT BOTS

1. ChatBots once created will available to customers or end users 24*7.
2. It helps to keep up with the modern trends as it uses simple messaging platform. Now-a-days, smart phone users don't download any new app in a month as user's have their core apps like Facebook, Instagram, Whatsapp etc.

3. Using ChatBots, customer service is improved a lot. These are always available for customer support. ChatBots, interact with customers proactively.
4. ChatBots make the engagement of customers more interactive with products by great sense of humor.
5. ChatBots are great tools to communicate with customers. With the feedback collected with simple questions, the service can be improved.
6. ChatBots make thing easier to approach global market.
7. ChatBots help in cost saving. Creating, implementing a fully functional ChatBot is cheaper than creating cross platform apps and having employees to support those apps.

V. DRAWBACKS OF CHATBOTS

1. ChatBots are not suitable for all business. These are suitable for predictable & stereotyped conversation such as pizza delivery service, taxi retails and travel

companies. But in Business To Business (B2B) companies, where direct client interaction needed there ChatBots don't work with 100% efficiency.

2. ChatBots have limited audience.
3. Sometimes ChatBots are confused with user's request. As they are not human beings, they can't improvise with information when it is needed.

REFERENCESS

- [1]. Documentation - <https://docs.api.ai/>
- [2]. <https://www.slideshare.net/DoYouDreamUP/chatbots-use-benefits-and-key-success-factors>
- [3]. <http://acuvate.com/blog/chatbots-on-skype-for-business/>
- [4]. <https://ankitbko.github.io/2017/02/Sykpe-For-Business-Bot-Using-UCWA/>
- [5]. Mahendra Prasad Nath, Santwana Sagnika, Madhabananda Das, Manjusha Pandey, "Object Recognition using Cat Swarm Optimization," International Journal of Research and Scientific Innovation (IJRSI) , Volume IV, Issue VIIS, July 2017