Microsoft Global Services Center (India) Pvt. Ltd.

An Industrial Internship Report

submitted by

Gaurav Bose
(13BCE0194)

in partial fulfillment for the award of the degree of

Bachelor of Technology

in

Computer Science and Engineering

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING

October 2016

DECLARATION BY THE CANDIDATE

I hereby declare that the Industrial Internship report entitled "**Microsoft Global Services Center (India) Pvt. Ltd.**" submitted by me to Vellore Institute of Technology, Vellore in partial fulfillment of the requirement for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering** is a record of bonafide industrial training undertaken by me under the supervision of **Mr. Rajeev Gupta, Data Science Division, Microsoft Global Services Center and Prof. Jimmy Mathew, VIT university .** I further declare that the work reported in this report has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

School of Computing Science & Engineering

BONAFIDE CERTIFICATE

This is to certify that the Industrial Internship report entitled "**Microsoft Global Services Center (India) Pvt. Ltd."** submitted by **Gaurav Bose (13BCE0194)** to Vellore Institute of Technology, Vellore in partial fulfillment of the requirement for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering** is a record of bonafide Industrial Internship undertaken by him/her under my supervision. The training fulfills the requirements as per the regulations of this Institute and in my opinion meets the necessary standards for submission. The contents of this report have not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

Prof. Jimmy Mathew

SUPERVISOR
Associate Professor

Date:

Date:

Internal Examiner (s)

External Examiner (s)

Microsoft Global Services Center (India) Pvt. Ltd.
Microsoft Campus, Gachibowli
Hyderabad - 500032

Tel: 91-040-66930000
Fax: 91-040-66932999
http://www.microsoft.com

Dated: 1/08/2016

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Gaurav Bose** from **Vellore Institute of Technology, Vellore** worked with **Microsoft Global Services Center (India) Pvt. Ltd.**, as an **'Intern'** from **30 May, 2016 to 22 July, 2016** and has successfully completed his Academic Internship under the guidance of **Rajeev Gupta (rajeevg@microsoft.com)**

Title of the Project: **BotClient**

We wish him all the best for his future endeavors.

Yours Sincerely,

FOR Microsoft Global Services Center (India) Pvt. Ltd.,

Senthil Gnanasekaran

HR Director

ACKNOWLEDGEMENT

I wish to express my gratitude to Mr. Rajeev Gupta for giving me the opportunity to do my internship and work on his project “BotClient”. He has assisted us throughout and his insights regarding and guidance during the project duration are appreciated.

I sincerely thank Mr. Rajesh Nair for being our SME (Subject Matter Expert), his guidance, encouragement and knowledge regarding during the internship made it a learning experience that I will never forget. I would also like to thank all the other members of the team who rendered their help during my internship and our customer Mr. Sourabh Mishra for finding time of his busy schedule to address the concerns regarding certain demands.

I also would like thank Prof. Jimmy Mathew, Assistant Professor (Senior) for giving me the opportunity to learn in the form of an internship.

Place : Vellore

(**Gaurav Bose)**

Date :

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE

1. SME- Subject Matter Expert
2. TA- Technical Advisor
3. NLP- Natural Language Processing
4. LUIS- Language Understanding Intelligent Service
5. UCP- Use Case Point
6. OSE- One Service Estimator
7. CAD- Custom Application Development
8. IDC- India Development Center
9. IT- Information Technology
10. GD- Global Delivery
11. GCS- Global Consultancy Services.

1. Synopsis

In my internship I was given the task of creating a bot for our customer that reduces human-human interaction and saves times while clarifying doubts and errors that customers of a certain product (One Service Estimator) face.

In this report, I have described the knowledge that I have gained in the making of this bot, we will also take a look at the nature of the company, various software and hardware that the company has manufactured or is currently working on, the report also focuses on my programming knowledge before the internship and how I made use of this knowledge to further enhance my skill set and learn new techniques which helped me complete the task. The scripting languages I learnt during the internship will help me from an academic perspective. The use of restful APIs, NLP tools such as LUIS and other services under a given bot framework and also overcoming challenges during our project duration only improved my skills in a holistic manner. I have also shown how direct involvement with upcoming technologies such as BOTs, NLP tools and the ubiquity of IOT has helped me decipher, design, implement and write a paper on how these facets can be combined into a single field.

The work culture and environment also forms an important part of any organization and it is vital for the success of a project, the description about the work culture, environment and the software and other resources used are also brought to light in this report.

2. Introduction

LIO (LUIS In OSE) is a smart interactive stand-alone bot here to serve you as a friend who would guide you through the path to solve your problems, should you face any while using the One Services Estimator. Chat with it in a friendly manner and ask your question, and let LIO help you get your problems solved.
LIO also has friendlier and more powerful avatars where its capabilities have been enhanced by Microsoft Cognitive Services, so that it could help you in an even more friendly fashion.

Some of its features are listed below:

- Smart, Natural Language Understanding.
- Clears doubts and corrects errors
- Multilingual, speaks 53 different languages
- Extensible
- Authenticates users
- Cross Platform and Responsive
- Active Learning
- Ticket Raising features.

3. About the organization

Microsoft Corporation (commonly referred to as Microsoft or MS) is an American multinational technology company headquartered in Redmond, Washington, that develops, manufactures, licenses, supports and sells computer software, consumer electronics and personal computers and services. Its best known software products are the Microsoft Windows line of operating systems, Microsoft Office ,office suite, and Internet Explorer and Edge web browsers. Its flagship hardware products are the Xbox video game consoles and the Microsoft Surface tablet lineup. As of 2011, it was the world's largest software maker by revenue, and one of the world's most valuable companies.

Microsoft was founded by Paul Allen and Bill Gates on April 4, 1975, to develop and sell BASIC interpreters for the Altair 8800. It rose to dominate the personal computer operating system market with MS-DOS in the mid-1980s, followed by Microsoft Windows. The company's 1986 initial public offering (IPO), and subsequent rise in its share price, created three billionaires and an estimated 12,000 millionaires among Microsoft employees. Since the 1990s, it has increasingly diversified from the operating system market and has made a number of corporate acquisitions. In May 2011, Microsoft acquired Skype Technologies for $8.5 billion in its largest acquisition up to, June 2016 announced plan to acquire LinkedIn for $26.2 billion.

Microsoft India Private Limited is a subsidiary of American software company Microsoft Corporation, headquartered in Hyderabad, India. The company first entered the Indian market in 1990 and has since worked closely with the Indian government, the IT industry, academia and the local developer community to usher in some of the early successes in the IT market.

Microsoft currently has offices in the 13 cities of Ahmedabad, Bangalore, Chandigarh, Chennai, Coimbatore, Hyderabad, In dore, Jaipur, Kochi, Kolkata,Mumbai, New Delhi, and Pune. Increasingly, the company has become a key IT partner of the Indian government and industry, supporting and fuelling the growth of the local IT industry through its partner enablement programs. Since its entry into India, Microsoft has focused on three key objectives:

- To become a key IT partner of the Indian government and the local IT industry
- To support and fuel growth of the local IT industry through its partner enablement programs
- To use the Microsoft Unlimited Potential program to enhance education, jobs and opportunities and foster innovation through relevant, affordable access to computing.

Microsoft in India employs about 6,500 people and has six business units representing the complete Microsoft product portfolio. Bhaskar Pramanik, Chairman of Microsoft India, announced that Microsoft intends to provide free internet connectivity across India.

3.1 Microsoft IDC

Microsoft India Development Center is one of Microsoft's largest R&D centers outside the Redmond headquarters. Set up in Hyderabad in 1998, we represent Microsoft's strategy of globally shared development to build products and services.

Some of India's most talented people work at our locations in Bangalore, Delhi, Hyderabad and Pune, within any of Microsoft's three engineering groups – Applications and Services, Cloud and Enterprise, and Windows and Devices.

Irrespective of geography or team, every employee is committed to realizing Microsoft's mission of empowering every person and organization on the planet to achieve more. Specifically, in India, we are contributing to building technology to empower emerging markets.

3.2 Microsoft IT

Microsoft IT India - located in Hyderabad is the largest IT operations center outside of Microsoft headquarters in Redmond. It is the offshore arm of the IT Engineering Division that develops mission-critical business applications for Microsoft Corporation.

Microsoft IT is looking for industry professionals and university graduates who want to help transform the company, innovate using Microsoft products, and impact millions of customers and partners.

3.3 Microsoft GCS

We are the global delivery arm of Microsoft Services. We're known for our commitment to delivery excellence, and are the only SEI CMMI Level 5

organization in Microsoft. Whether it's cloud computing or mobility, retail or financial services, United States or Japan – we help leading global organizations run, grow and innovate better.

Work-life balance is of prime importance at Microsoft Services Global Delivery. In addition to being industry-certified, world-class delivery experts, our people know how to have fun! A 54-acre campus coupled with great infrastructure and facilities – Global Delivery is surely the place to be.

Our work comprises highly intensive consulting engagements that require the seamless integration of business and technology. Our professionals deliver large and complex solutions for complex business needs by leveraging the latest technologies in the Microsoft stack. We provide a range of proven consulting services and offerings designed to support our customers with business planning, business-critical application development, technology deployment, optimization and support.

We help our customers plan, deploy and run their IT infrastructure through deep expertise, collaboration, and full lifecycle capabilities. Our knowledge bank provides insights into best practices and process, which helps our consultants drive innovation across Microsoft technologies, be it Office 365, Windows 7, SharePoint, Azure or Dynamics or Mobility.

With thousands of deployments across industries and geographies, we gain firsthand experience about what works and what doesn't. We then take this knowledge back to our product teams, so that they can embed it into our products — making our software and services all the more robust, intuitive and engaging.

Whether it's a large transformative engagement or an accelerated industrialized services deployment, Germany or Brazil, retail or financial services, our customers view us as a trusted partner who delivers results. And we have done it time and again, which is reflected in high Customer Satisfaction (CSAT) scores for most of our engagements.

At Microsoft Services Global Delivery, you will enjoy exciting career opportunities, acquiring deep domain expertise and technical excellence. Just some of the immensely satisfying things you can do with us: Be a part of the most complex consulting and technology projects across the globe. Maximize business outcomes for Fortune 500 and Global 2000 corporations across industries. Collaborate with worldwide communities. Master N+1 Microsoft technologies like Windows Azure, Office 365, Microsoft SharePoint 2010 or Microsoft Dynamics. What this means is simple: in addition to experiencing next-generation consulting, you're also making technology work smarter — you're making a difference. .

4. Skill set prior to internship:

The completion of various courses in VIT has given me a wide range of skill sets, the main skill sets are as follows:

- C programming, using C to work and create basic arithmetic functions to writing code for various complex algorithms.
- The ability to make new algorithms to solve a problem using data structures.
- Optimizing the algorithm, so that the program code gets executed in the required time and the overall complexity of the program code is reduced.
- C++ programming, an Object oriented approach helped me in various ways throughout the internship.
- C# was the main coding language used for implementing the above project.
- Control flow and conversational design flow helped me make the product more cogent.
- Various architecture concepts like cache memory management, helped me reduce retrieval time.
- Creation and use of Restful APIs taught me their benefits.
- The importance and ubiquity of cloud services and technology helped me understand its need and associate it to our project.
- The security risks and knowledge of the same allowed us to configure the bot with our own secure channel.

5. LIO bot and its features in detail.

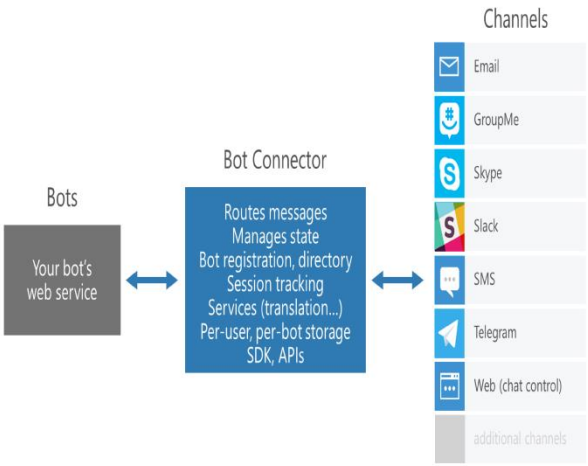
5.1 Botframework

The bot web service initially uses a bot connector to provide it an interface or connection with the appropriate channels that can use bots. The bot framework provides an SDK that is installed in Visual Studio. This framework allows us to maintain a message controller across multiple platforms. This is the foundation of our bot and without a message controller, our bot will not exist.

5.2 BotConnector

The main purpose of the bot connector is to route messages, manage the state of the bot, keep in track the registration of the bot, session tracking, storage requirements and language translations.

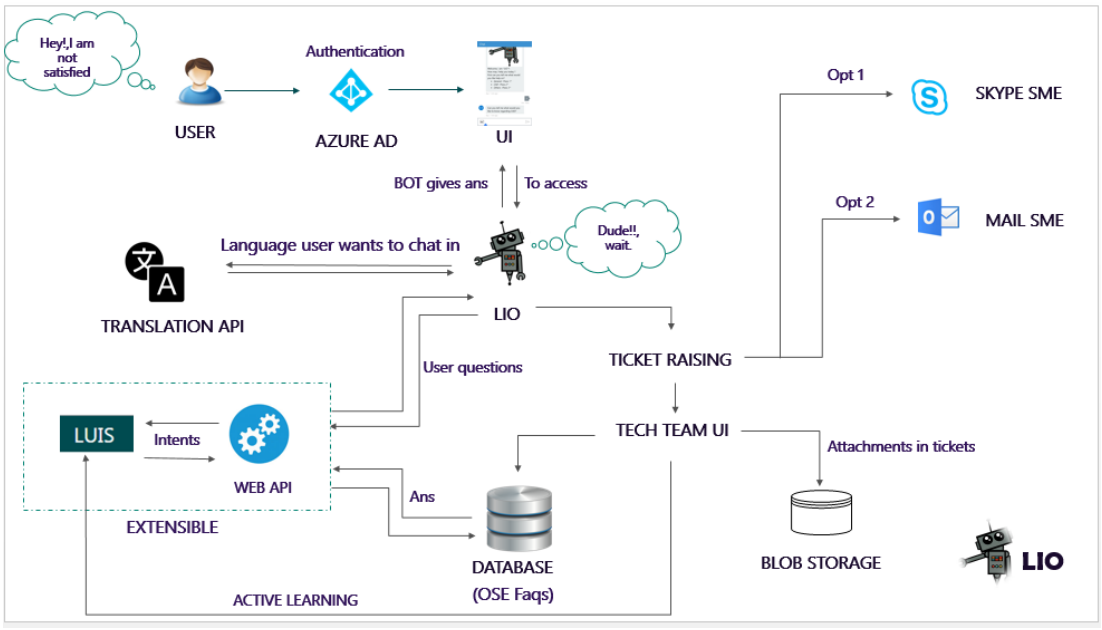
The channels used are services that generally use the bot and further improve its usability.



5.3 LUIS- NLP

Language Understanding Intelligent Service is a free Microsoft service that allows us to make, design, train data into various models that can be used to identify a user's intent. It helps us create a bot driven conversation and the presence of inbuilt entities and various other identifiers along with its restful nature only helped us enhance the bot. Its practicality and functionality are discussed in detail, below. The programmatic API attached to it helped us to add another dimension of active learning to our bot that makes it more unique.

5.4 The Bot itself



5.4.1 Problem Solving:

LIO tries to solve your problems to the best of its capabilities. If you ask it a question it knows the answer to, it'll immediately provide you with the detailed answer, mostly along with necessary pictures to provide you a better understanding of the solution.
If you are not very clear about the question yourself, and ask something LIO is not entirely sure of, it'll still try to solve it for you. It'll ask you questions regarding your problem to get a better understanding of the exact issue you are facing. It'll show the response in the same explanatory manner once it fully understands your question.
And if the response shown to you does not solve your problem, LIO tries to solve it one more time, before redirecting you to other sources of help.

5.4.2 Ticket Raising:

Even after trying twice, if LIO is still not able to answer you satisfactorily, it will redirect you to other methods to obtain help from the technical team of OSE.
LIO is capable of redirecting you to the following methods of obtaining Technical Support: -

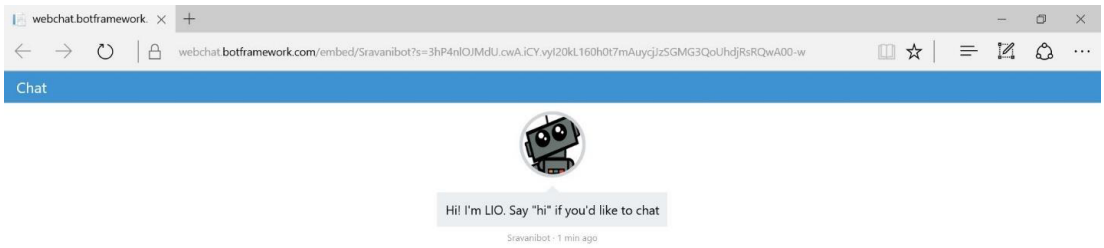
- **Support Ticket Raise:** You'd be able to raise a ticket where you could describe the details of the issue you are facing, along with screenshots or pictures. The ticket would be raised and the Technical Team would be notified, who would in turn get back to you and solve your issue.
- **Skype with SME:** You would be provided with links where you could connect to the Subject Matter Expert over Skype.
- E-mail: You will also get links to send emails to the Technical Team.

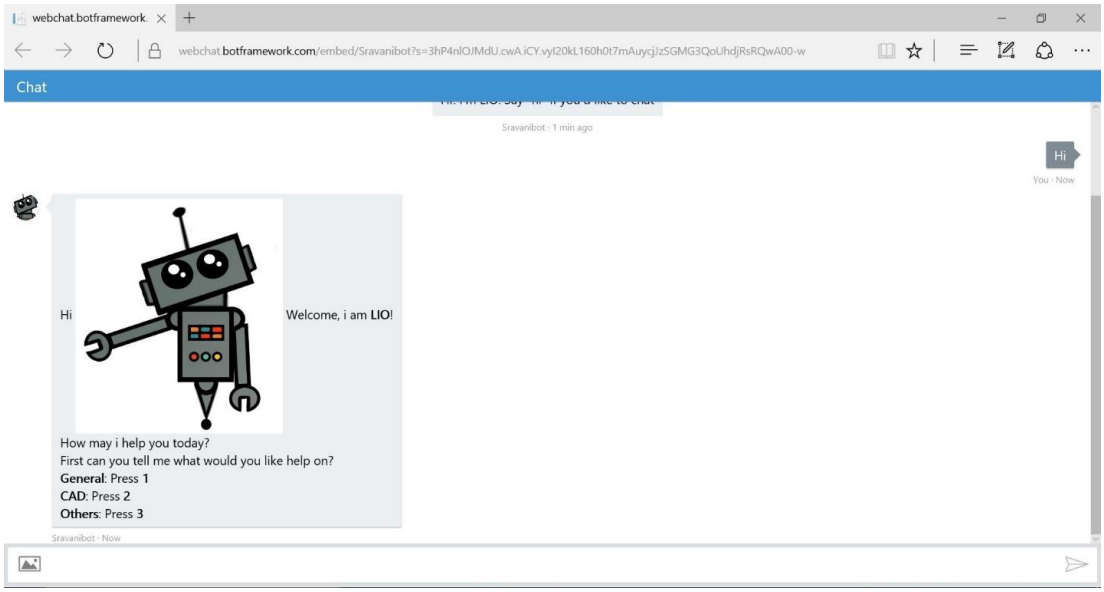
5.4.3 Active Learning:

If you are a technical team member, you would have access to the Tech Team UI which is a part of the LIO Bot Package. You can use this UI to update answers to existing questions or add new questions to the database. You will also be able to close tickets after solving the issue.
The UI would also enable you to dynamically train LUIS models so as to enhance the understandability of models over time.

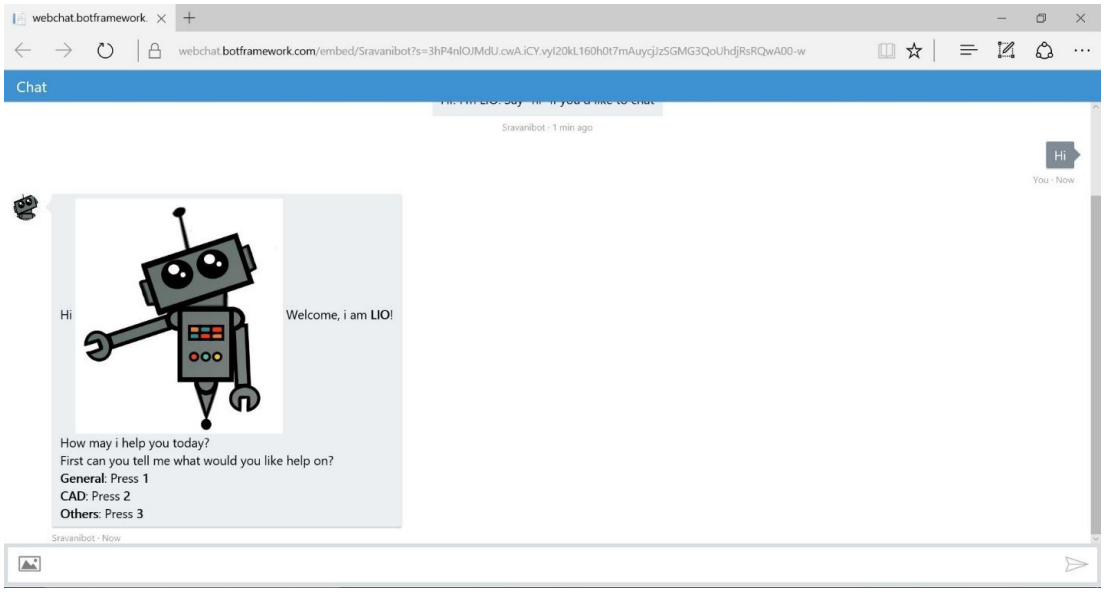
5.4.4 Conversations:

Say “HI” to LIO. Greeting LIO would start your conversation, and LIO would direct you through the conversation thereon.





Work streams are the specific area of technology for which the estimate is to be created. You are most likely to be working with one of the work streams. LIO organizes its questions based on these work streams. So it’s important for you to know about work streams before you start using LIO.



LIO currently supports only the work stream *Custom Application Development (CAD).* It can also answer general questions about OSE.

The common questions regarding OSE and its functions are addressed here. Some examples of supported questions are

- "What is OSE?"
- *"What is a Work stream?"*
- "Will OSE work with Office Gemini?"

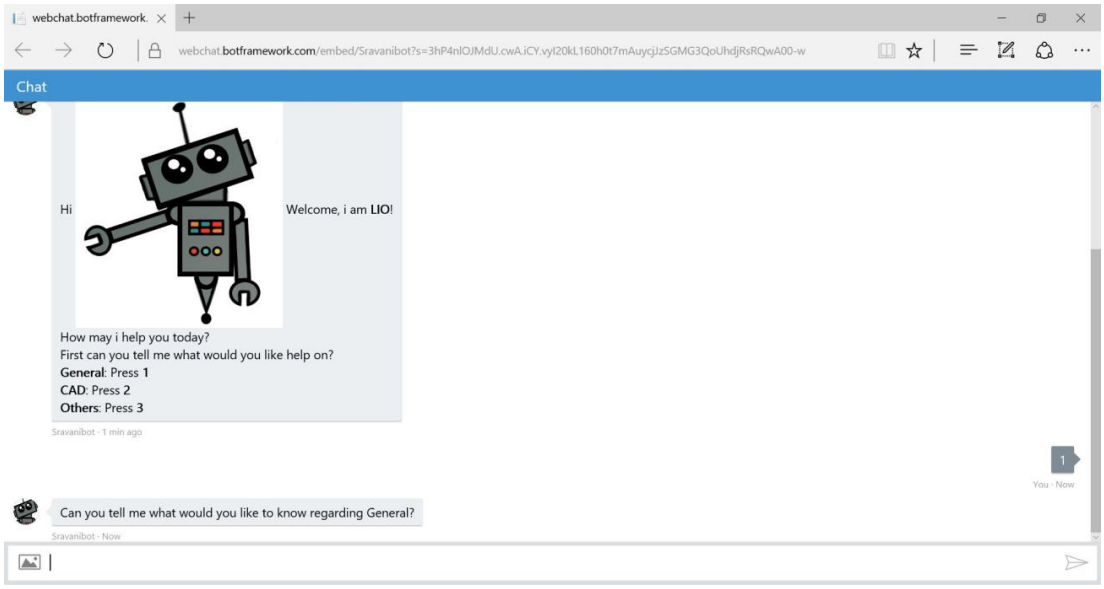
As the name suggests, CAD is the work stream to enable the user to estimate a custom application which the user is developing. It uses the *Use Case Points* method for calculating the effort by accounting for weights of actors, use cases, environment and technical complexity. LIO answers questions related to CAD under this. Some examples of questions supported under this work stream are: -

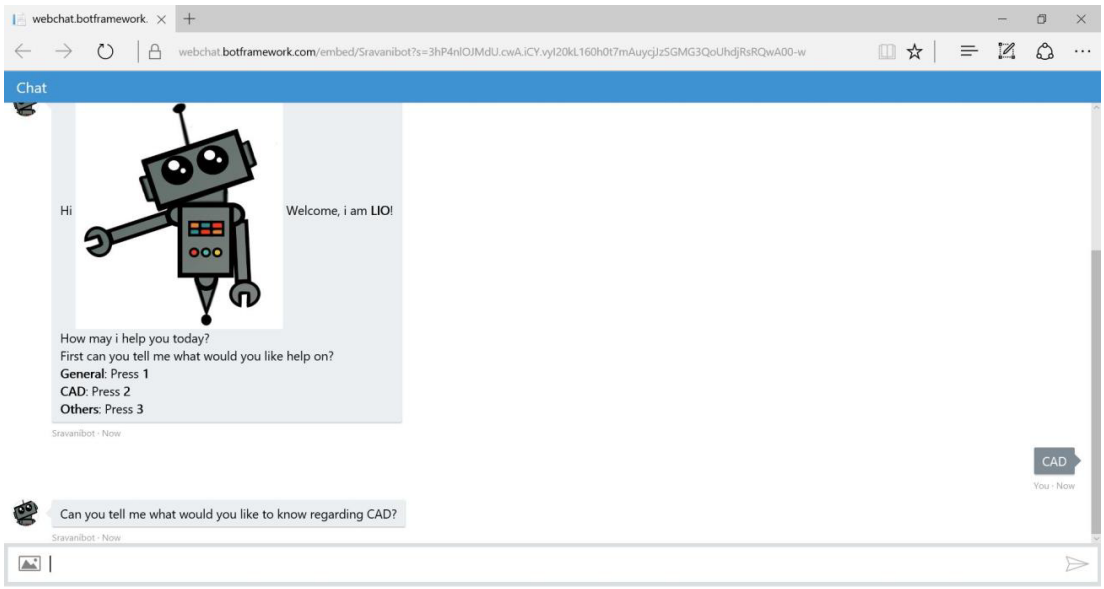
- "What is CAD?"
- "What is UCP?"
- "Why is functional test effort so low?"

LIO opens up the conversation with the instruction to select a work stream by choosing the appropriate shortcut.
The shortcuts are: -

- General : 1
- CAD : 2
- Others : 3

You could either use the shortcuts, or type-in the name of the work stream to select it. The examples are shown below.



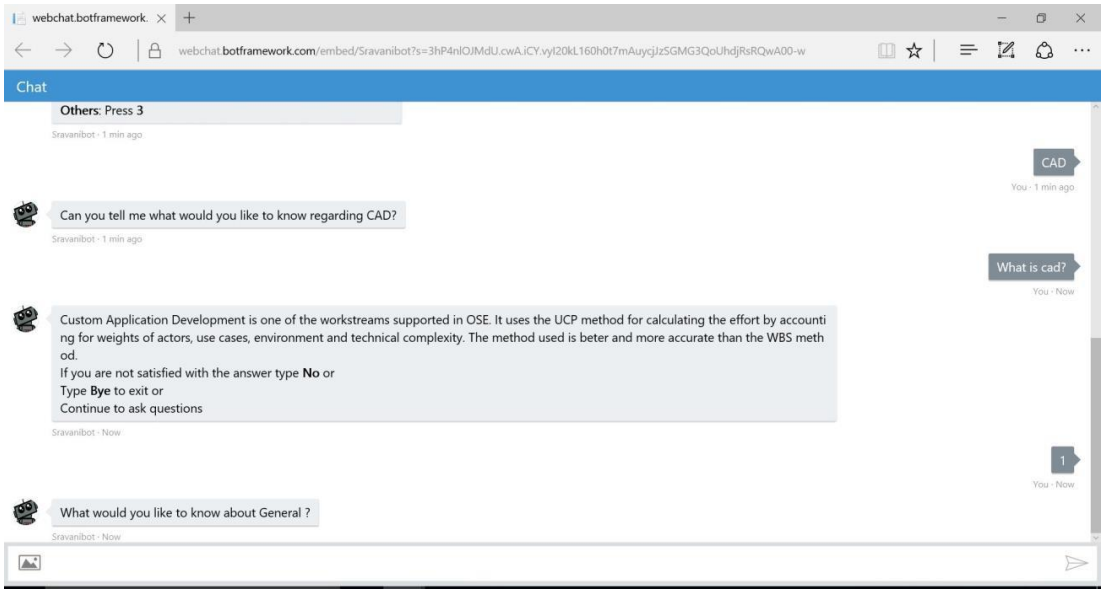


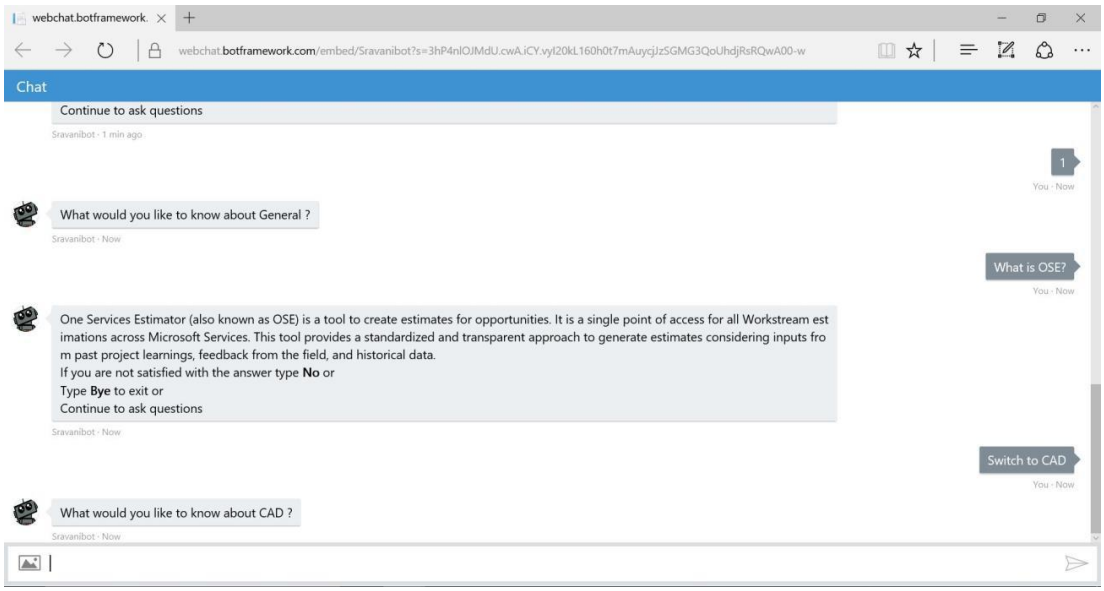
At any point in the conversation if you feel the need to switch between the work streams, you can still use the shortcuts, or give instruction to LIO to switch the work stream.
The shortcuts are: -

- General : 1
- CAD : 2
- Others : 3

Some examples of instructions could be

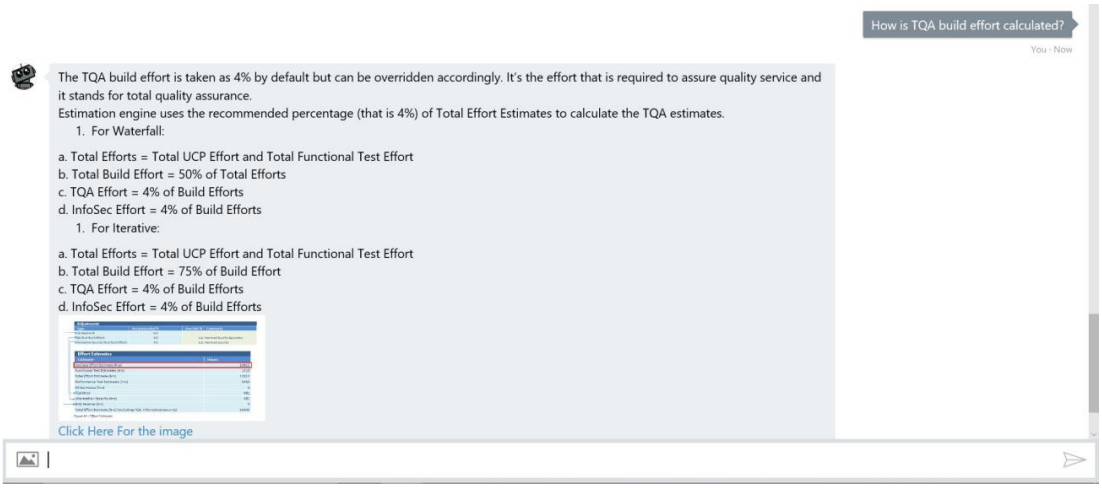
- “Switch to CAD”
- “Use General”
- “Go to CAD”



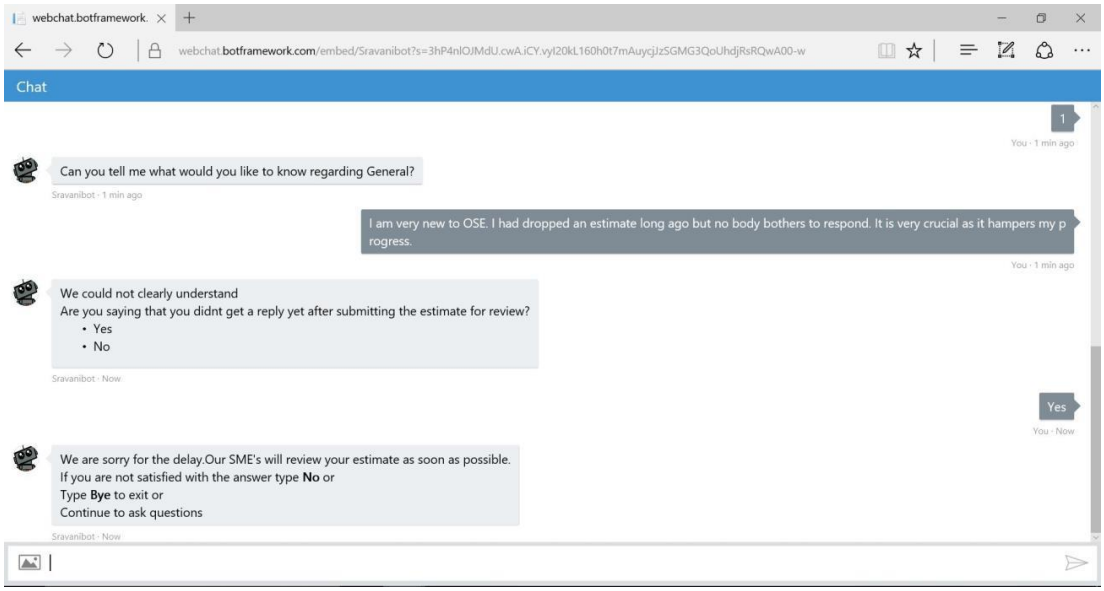


Now that you're going to begin asking questions to LIO, there're various situations which may arise depending upon the question you ask. And LIO will respond differently in each situation, with the ultimate aim to help you get the appropriate solution to your problem.
The different situations you may encounter, are elaborated in the following sections.

If your question is framed in a manner which LIO completely understands it perfectly, it would quickly display the answer.



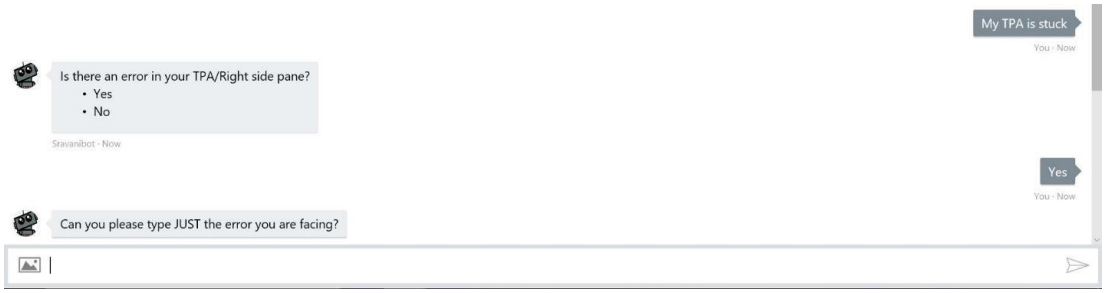
If you did not frame your question properly. LIO would get a faint idea of what you're really looking for. So to confirm what you really want to know, it would ask questions to confirm your doubt. Once you get your desired question, you'll say YES, and LIO will now fetch the solution for it.

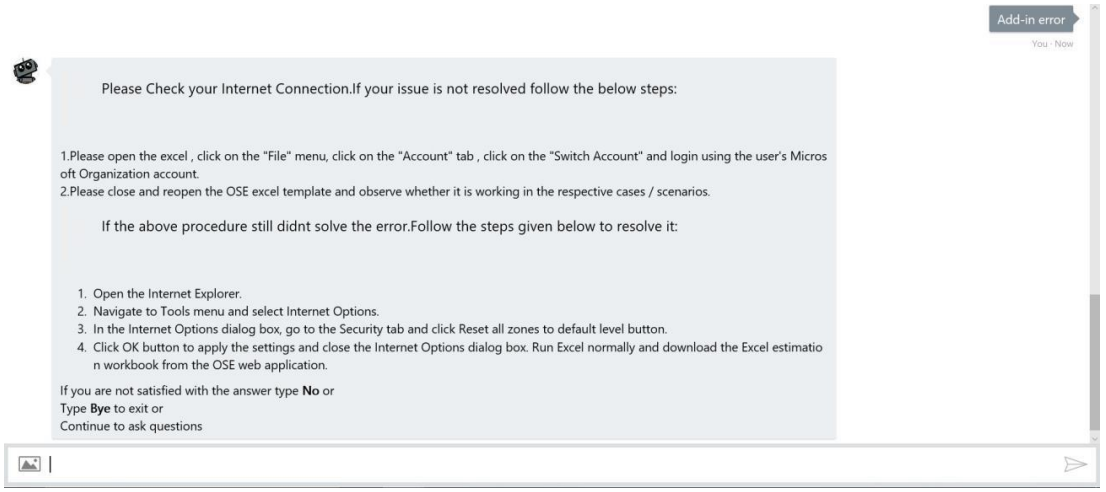


If the reason of your problem is some known error, LIO will ask you to enter the exact error. You will then have to tell it exactly and only the error you are facing. The following errors might have occurred: -

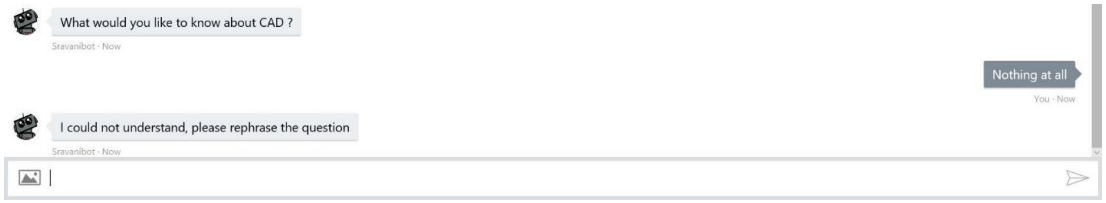
- Add-in error
- Failure during initial data load
- No permission error
- Look up init error
- Unknown error
- Internal Server Error
- Unauthorized Error

If you enter the correct error, LIO will help you solve it.



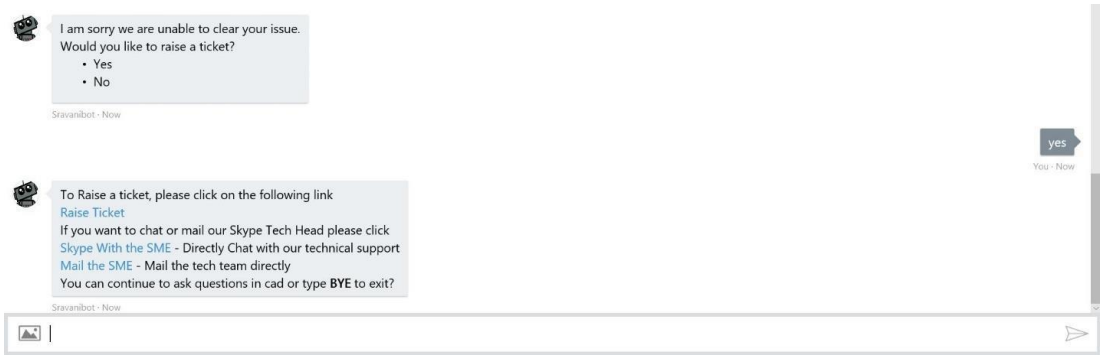


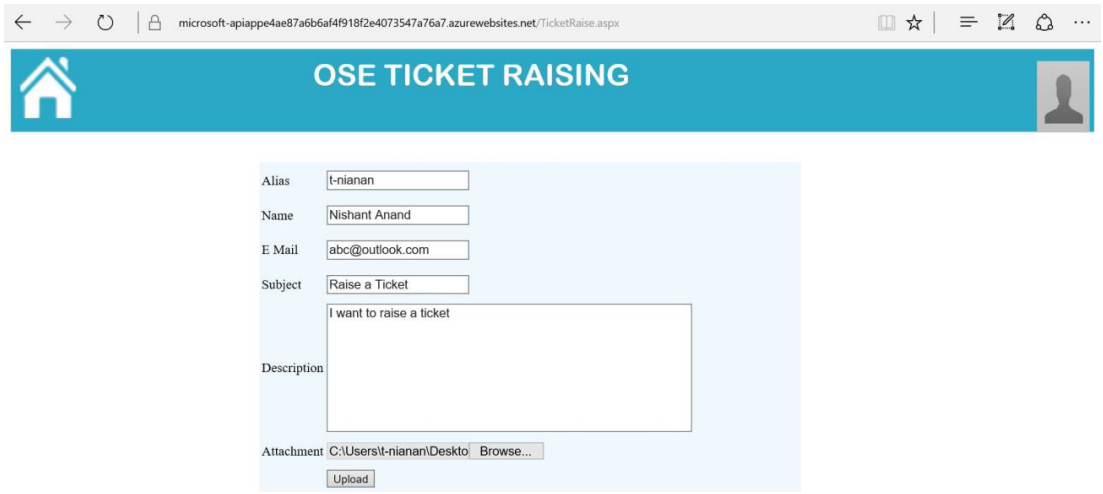
If you enter something which LIO doesn't understand at all, it'll ask you to rephrase your question to a more understandable statement.



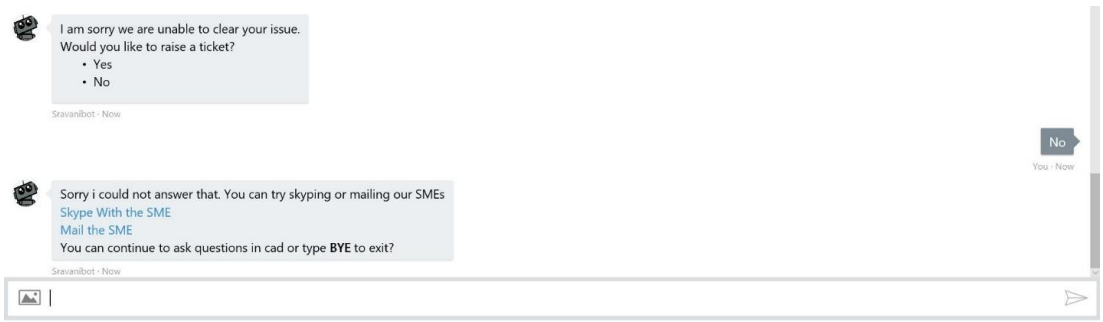
If LIO is ultimately unable to answer your problem satisfactorily, it'll direct you to escalate it further and seek help directly from the technical team.
It'll provide you the following means to do so.

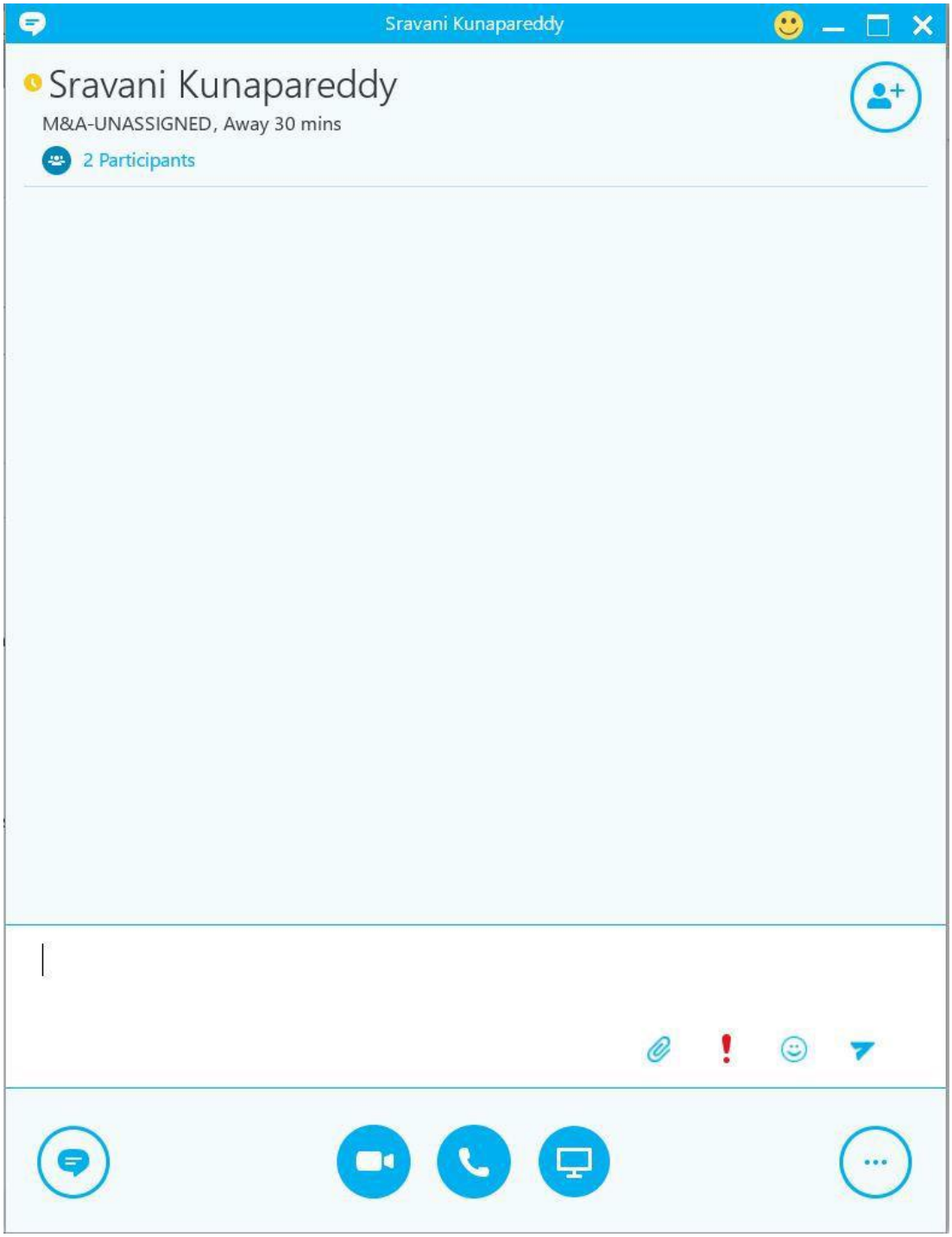
LIO will provide you a link where you can describe your problem, and optionally enter screenshots or attachments which you feel might prove helpful in describing your issue better. Once you submit it, you will receive an email which would confirm the raise of your ticket wherein the technical team would be notified about your query. They would then look into the issue and try to solve it for you.



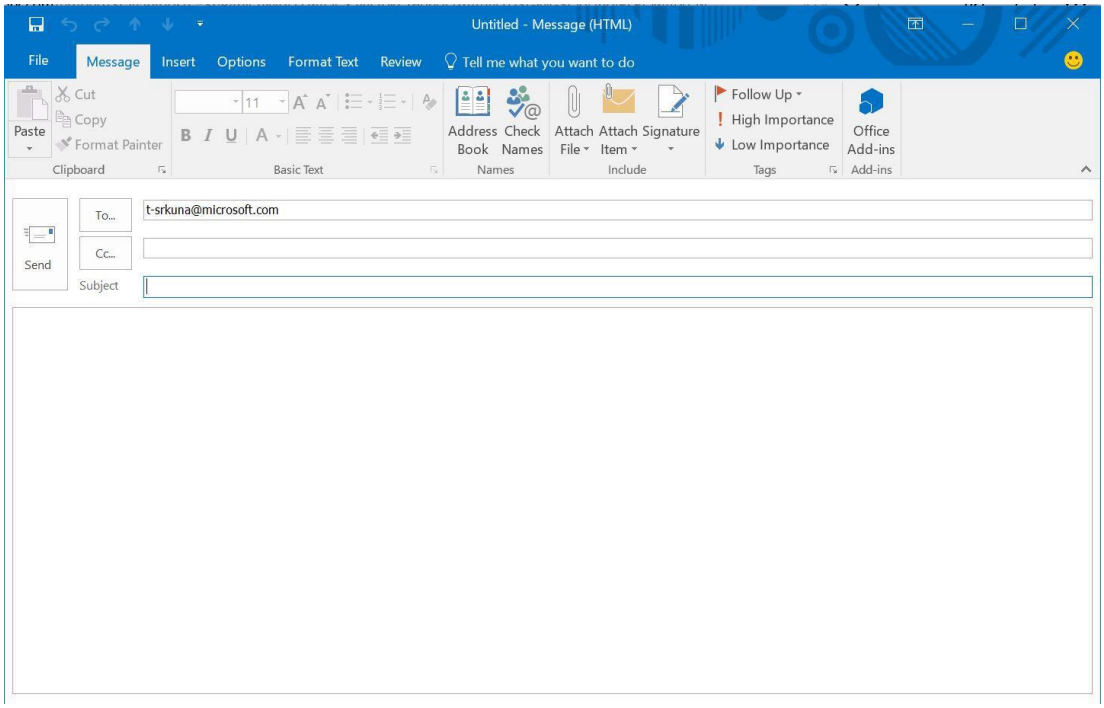


If you don’t want to raise a ticket, LIO will also provide you a link which would connect you directly to the SME over Skype-For-Business. You can then explain your problem and get solutions directly from the SME.

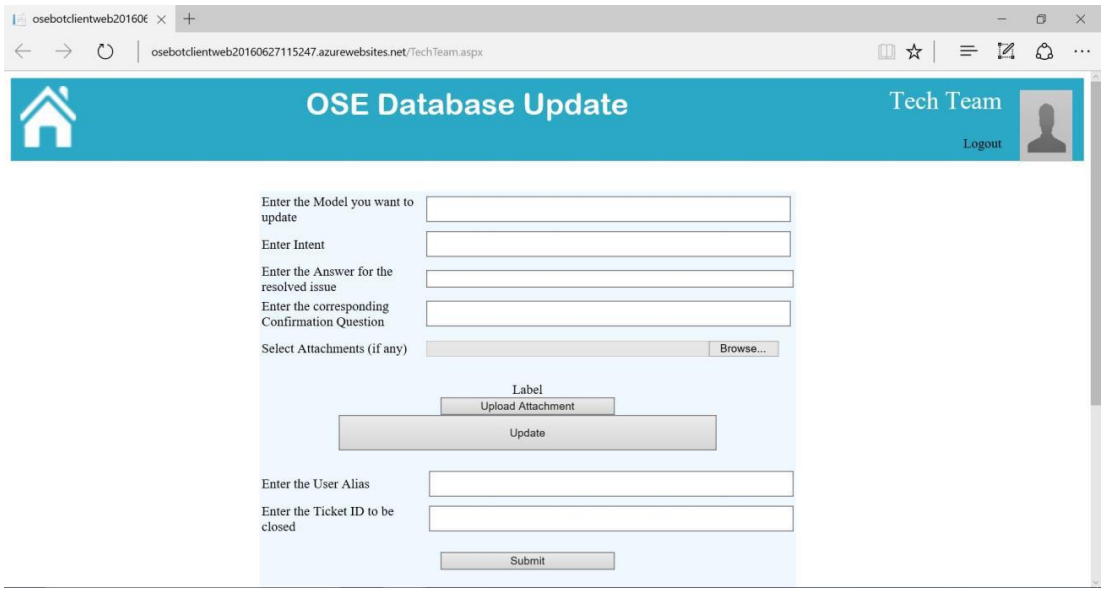




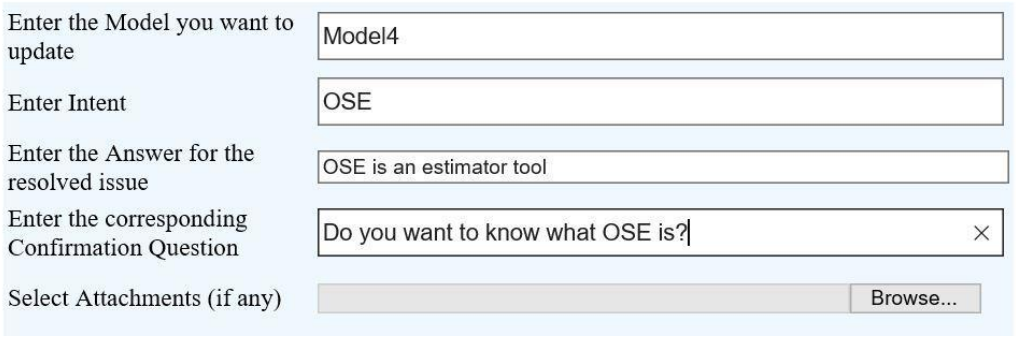
You can also choose to send an email to the technical team describing your problems, and seek their help.

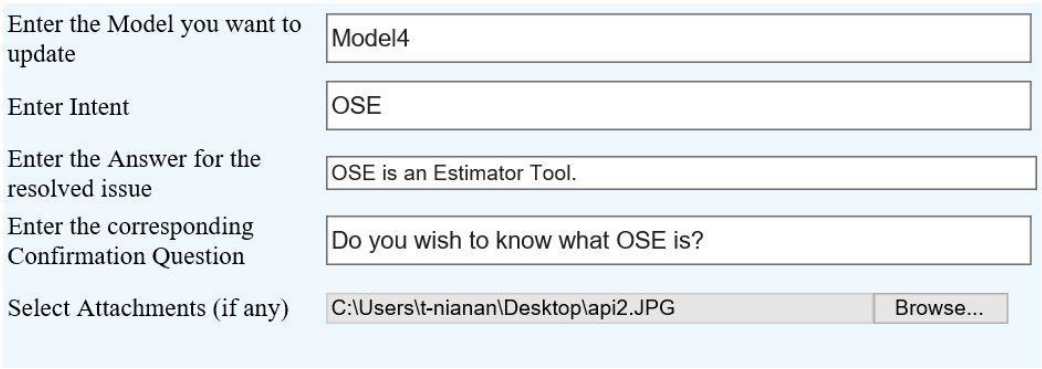


Since OSE is an ever improving tool, the questions that might bug the users will keep on adding up. The LIO package thus contains a separate interface for the Technical Team, which enables the team to train LIO to handle new questions, thus making it capable of learning and evolving parallel to OSE. It would be accessible only to the Technical Team.

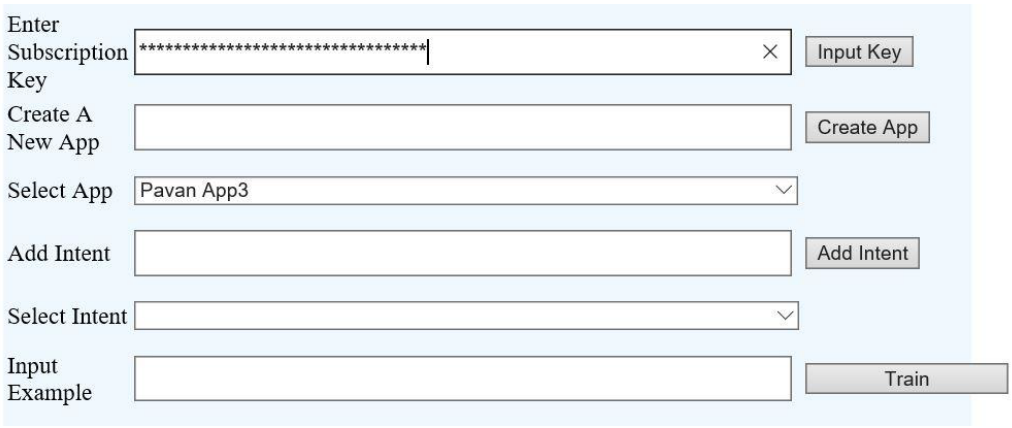


Using this interface, new questions and their responses can be added to the database of LIO. The necessary details have to be filled in, along with the pictures to be displayed with the response (if there are any).

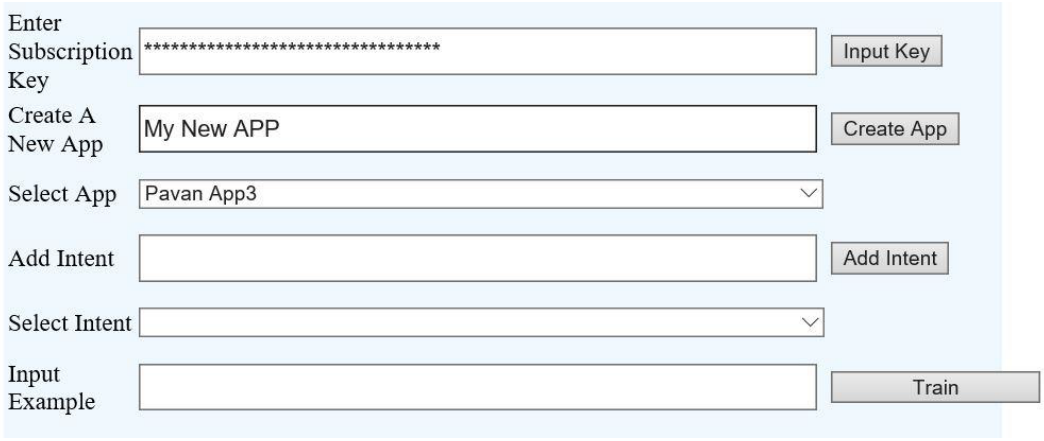


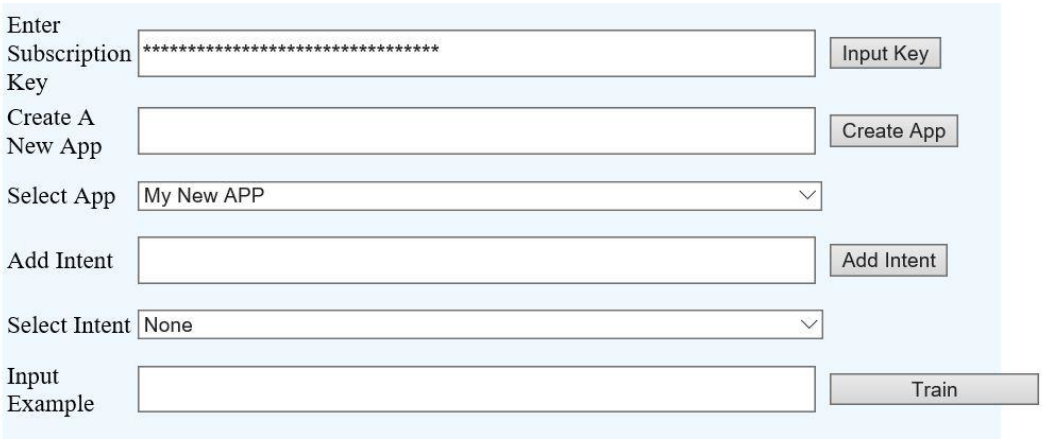


The Technical Team might also need to access the LUIS models for LIO, to enhance its understanding capabilities for existing questions or to make it capable of understanding new questions.
The interface thus provides all the necessary features of handling the LUIS model.
If you are a member of the Technical Team, you'll have to enter your subscription key to access all your LUIS apps here. Once you input the key, all your models will be displayed in the Drop Down List.

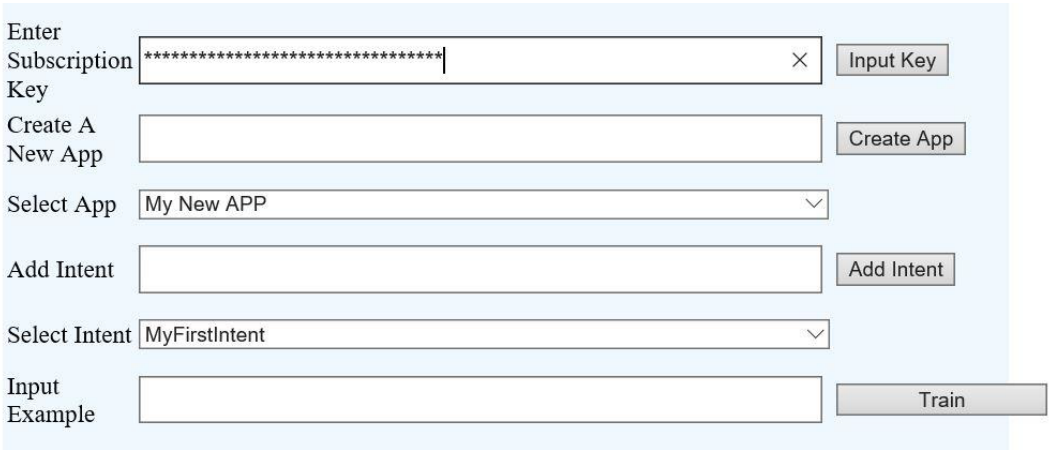


You can now add new apps to your account by writing the name of the new app and clicking on the button to create it. Once created, this new app would be dynamically displayed in the Drop Down List.

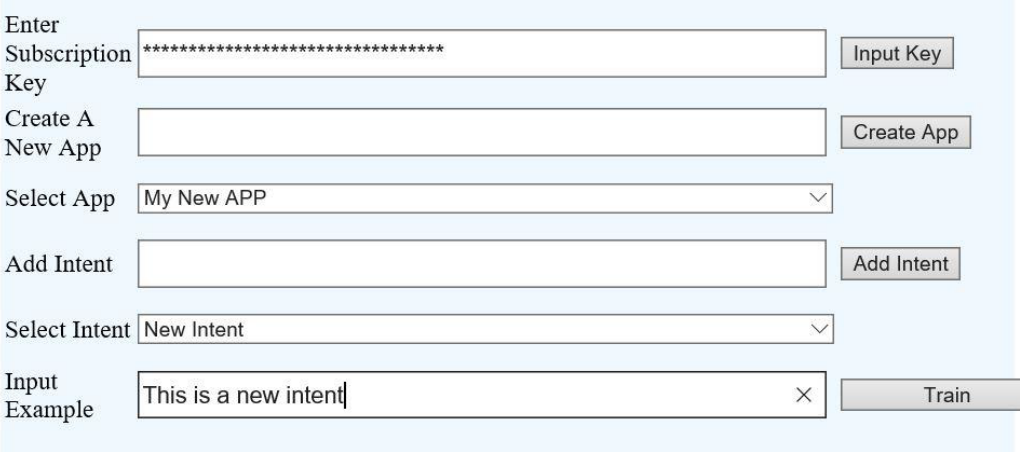




You now have to select the app in which you want to make changes. Once you choose an app from the drop down, it would dynamically populate the drop down for intents, i.e. all intents in that app would be displayed into the drop down.



After adding all the needed new apps and intents, you are now ready to train LUIS. Using the appropriate dropdowns, select the desired app and the intent you want the utterance to be trained to. Now, you can enter the utterance and then click on TRAIN to complete the training.



MULTILINGUAL

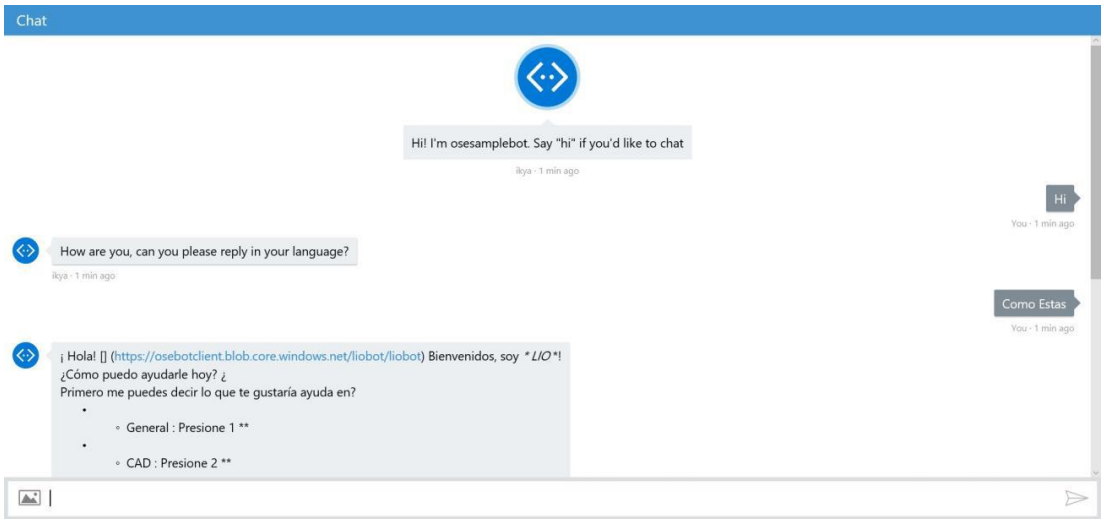
As introduced earlier, LIO can be made even smarter by adding the capabilities of Microsoft Cognitive Services to its arsenal. Currently LIO has 2 smarter avatars: -

- Multilingual LIO
- Listening LIO

More cognitive features would be added to LIO in its later versions.

Multilingual LIO, in addition to the features of the original LIO, also has the capability of understanding different languages. So you can chat with it in your native tongue, and it would still try to understand your question, and then respond back in the same language for your convenience. *Well… that's Friendship!!*
It currently supports the following 53 different languages.

Multilingual LIO starts the conversation in English, similar to the original LIO. But once the chat has been initiated, it asks you to enter a statement in your preferred language. And then the conversation proceeds in a manner similar to that in original LIO, but in YOUR LANGUAGE.



All you have to do is launch the Listening LIO, and then ask your questions by speaking them. And LIO will give you the answer.

6. Knowledge Acquired from In-plant training

A knowledge of C# programming was one of the main things that I acquired in my In-plant training and also an understanding of the software techniques used by programmers in a real world scenario. The importance of software project management, the importance of documentation, the need to estimate a project and the client-developer relationship were the key factors in the internship.

Working directly with a customer was a new experience. Starting from the inchoate phase of choosing a model of execution to the final testing phase was a taxing yet informative ride. The knowledge imbibed throughout cannot be scripted in a document but can only be shown through other projects.

Learning about upcoming technologies, the rise of bots and natural language processing helped me focus on my career and decide to further increase my knowledge in the given field. The unparalleled rise of artificial intelligence can only be supported by understanding human needs. This played a critical factor in my project.

There were many things we learnt, quantitatively and programmatically we can list a few of the technologies used:

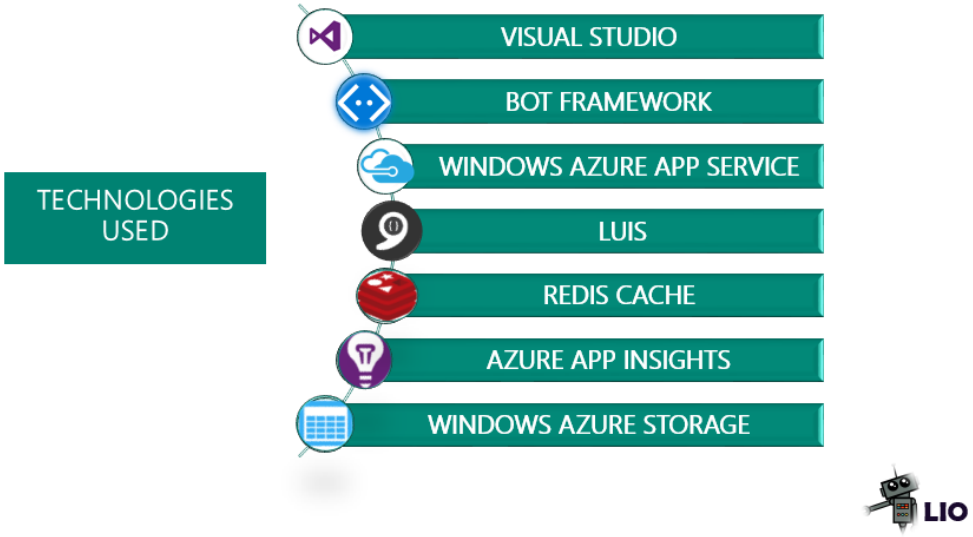
- Visual Studios
- Windows Azure
- Bot Framework
- Luis
- Redis Cache
- AppInsights

The programming requirements were:

- C#
- Python
- SQL queries
- Azure table queries
- Node.js
- JavaScript
- Prompt Dialogs
- Markdown Language

Other concepts learnt were:

- Software Management in a project
- Customer-Developer relationship
- Need for Agile methods
- Importance of documentation
- Importance of work ethic and culture
- How to overcome challenges
- How to thwart unprecedented demands
- Importance of a team
- Division of tasks
- Importance of testing



7. Competency Levels

Before	After
1. A working knowledge of C# and Visual Studio.	1. An improved knowledge about C# and Visual Studio and their advantages along with its pros and cons.
2. No knowledge about Natural Language Processing	2. A advanced knowledge about the tools and methods used for NLP and the use of Machine Learning in the same field.
3. A limited idea about the Bots and their advantages	3. A practical and pragmatic knowledge of the use and advantages of bots in all to most fields of technology.
4. Limited to no idea about SPM methods during the execution of a live project.	4. Better sense of why and the need for SPM techniques while doing a real live project. The importance of agile method and SCRUM methods. With weekly to daily project progress evaluation.
5. Limited idea about estimation techniques and their requirements.	5. Gained knowledge on how to use Functional points and Use Case Points in the same field.
6. No knowledge about the customer – developer-sme-ta relationship.	6. Knowledge on how an actual project works.
7. Limited to working knowledge about the cognitive services provided by Microsoft.	Precise and good knowledge about the design and use of cognitive services API provided by Microsoft.