# LawBot

# A CHATBOT WHICH ASSIST PEOPLE WITH THEIR LEGAL ISSUES

Project ID: 18-010

Project Proposal Report

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**Submitted on: 02-04-2018**

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## Declaration

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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## Abstract

To get the necessary legal advice, legal information related to different scenarios in life what people mostly do is visit a place where they think they can get the service done. This way involves lot of time, cost and of course it's inefficient. Maybe they have come to the wrong place seeking for information.

Or there are legal information providing websites and legal assistant apps where people needs to login first, search for the necessary information, filter out what they actually need and then logout. This way is again time consuming and not to mention how inefficient they are.

What if there's that one particular lawyer who is available there 24/7, and you don't need to search for any of the data but you just have to ask for any of the legal information you need and instantly provides you with the all the needed information. How easy and efficient that is?

We are going to build a legal assistant chatbot similar to what I explained above, but the only difference would be instead of a lawyer helping you with this process, there will be a chatbot more like a robot which helps you to find the necessary information. But you will never feel like you are chatting with a machine but it would be like a normal human conversation.

A chatbot works using Natural Language Processing (NLP), which is an artificial intelligence field concerned with interactions between human languages and computers. The text or audio provided by the user is analyzed and processed by the bot and responds appropriately.

Continuous research & development in AI and Machine Learning is fostering the creation of smarter bots with natural, accurate and intelligent responses. [1] When it comes to law, it spans over a wide area, branching in to so many categories. Our chatbot will only assist you in few areas. A chat session follows a script that guides the user through a conversation designed to convert the prospect into a lead. This is similar to interacting with the "live agent" but it is software automatically answering the questions and collecting the data based on what the user has input. By asking one question at a time, a chatbot narrows down the exact data the user is

seeking in the shortest time possible. When the exact information user is seeking for is understood by the chatbot, after a series of related questions, it will provide the necessary information to the user.

And also, we provide with a discussion forum where people can post their questions related to the relevant law area, so that other people can reply, comment to those questions. Or else people can vote others' answers. Answers with the highest number of votes will come to the top.

# Contents

## List of Figures

# 1. INTRODUCTION

## 1.1 Background Study

When it comes to legal information, people find it very hard to get the accurate and exact information they need. And for most of the situations people face in life, at least they don't have an idea whether there are laws to address such situations. People get wrong ideas based on different peoples' opinion. Mainly in Sri Lanka there's no any way to access these legal information except the website Government Information Center (GIC). But that also needs lot of searching based on keywords. It takes time and inefficient.

That's the main reason for us to develop a chatbot which is more like you are having a conversation with a lawyer face to face. And this is available 24/7 and you can access from anywhere. We are trying to make this so similar to natural human communication patterns. But our chatbot will only assist you only in some specific legal areas at the moment.

## 1.2 Literature Review

1. S. Debnath,Tulsa Univ., OK, USA,S. Sen,B. Blackstock ,**" LawBot: a multiagent assistant for legal research"**

   LawBot is a system of Internet based agents that help to collect and organize the statutes and case histories relevant to a legal search. The system includes an ontology that maps colloquial terms to corresponding legal terminology, thus simplifying the system's use by people outside the legal profession. [1]

2. Jeesoo Bang,Hyungjong Noh,Yonghee Kim,Gary Geunbae Lee ,**"Example-based chat-oriented dialogue system with personalized long-term memory"**

   This study introduces an example-based chat-oriented dialogue system with personalization framework using long-term memory. Previous representative

chat-bots use simple keyword and pattern matching methodologies. To maintain the quality of systems, generating numerous heuristic rules with human labour is inevitable. The language expert knowledge is also necessary to build those rules and matching patterns. To avoid high annotation cost, example-based dialogue management is adopted for building chat-oriented dialogue system. We also propose three features: POS-tagged tokens for sentence matching, using NE types and values for searching proper responses, and using back-off responses for unmatched user utterances. Also, our system automatically collects user-related facts from user input sentences and stores the facts into a long-term memory. System responses can be modified by applying user-related facts in the long-term memory. A relevance score of a system response is proposed to select responses that include user-related fact, or frequently used responses. In several experiments, we have found that our proposed features contribute to improve the performance and our system shows competitive performance to ALICE system with the same training corpus. [2]

**3.** Sumit Negi,Sachindra Joshi,Anup K. Chalamalla,L. Venkata Subramaniam, **" Automatically Extracting Dialog Models from Conversation Transcripts"**

There is a growing need for task-oriented natural language dialog systems that can interact with a user to accomplish a given objective. Recent work on building task-oriented dialog systems have emphasized the need for acquiring task-specific knowledge from un-annotated conversational data. In our work we acquire task-specific knowledge by defining \textit{sub-task} as the key unit of a task-oriented conversation. We propose an unsupervised, apriori like algorithm that extracts the sub-tasks and their valid orderings from un-annotated human-human conversations. Modeling dialogues as a combination of sub-tasks and their valid orderings easily captures the variability in conversations. It also provides us the ability to map our dialogue model to AIML constructs and therefore use off-the-shelf AIML interpreters to build

task-oriented chat-bots. We conduct experiments on real world data sets to establish the effectiveness of the sub-task extraction process. We codify the extracted sub-tasks in an AIML knowledge base and build a chatbot using this knowledge base. We also show the usefulness of the chatbot in automatically handling customer requests by performing a user evaluation study. [3]

4. S. Sinha,M. Lall,S. J. du Preez, **"An intelligent web-based voice chat bot"**

This paper presents the design and development of an intelligent voice recognition chat bot. The paper presents a technology demonstrator to verify a proposed framework required to support such a bot (a web service). While a black box approach is used, by controlling the communication structure, to and from the web-service, the web-service allows all types of clients to communicate to the server from any platform. The service provided is accessible through a generated interface which allows for seamless XML processing; whereby the extensibility improves the lifespan of such a service. By introducing an artificial brain, the web-based bot generates customized user responses, aligned to the desired character. Questions asked to the bot, which is not understood is further processed using a third-party expert system (an online intelligent research assistant), and the response is archived, improving the artificial brain capabilities for future generation of responses. [4]

### 1.2.1 Existing Systems

There are some chatbots available giving you legal assistance which has several downsides. One of the biggest downside is they don't allow user to ask any kind of legal related question as they wish. They restrict user's natural way of conversation by commanding user to select an option out of the pre-defined options. This is more like navigating through a normal app with some radio buttons and dropdowns They

always expect the user to follow their predefined procedure. This is totally contrast to the way a chatbot should actually work. To address these kind of problems, we are providing a new legal assistant chatbot which allows for a more user friendly, natural two- way communication. Ex: Ailira, PaperStreet.

If you have ever used Ailira and PaperStreet what they actually do is instead of providing the necessary information, they direct us to a attorney working on that area of concern and leave us a with a message saying that attorney will contact you in future. Does that sound like a chatbot? You don't need that kind of chatbots when you could directly contact a lawyer on your own. Our chatbot will guide you through legal solutions step by step with providing the links to download the necessary documents and nearby locations.

### 1.3 Research Problem and Research Gap

People face several issues in day today life. For example, misplace of NIC, met with an accident, crops or property damaged by elephants, need to get the passport. In case of such issues, people has no clear idea on is there a legal solution to the issue, if there's a solution what procedure to follow, from where to get the information. So in search of legal assistance what are the options people turn up to? People either go to a legal advice providing place or some might even come to wrong conclusions based on friends', relatives' advice. Or sometimes they might need to waste hours in searching necessary information from the relevant websites or some might have legal assistant apps installed on their phones like Black's Law Dictionary, Fast case etc. If app is the option, then again they need to login, search for hours and logout. Anyway people go through several hardships to get the necessary information. All of these methods are very time consuming, cost consuming and needs lot of effort in searching so they are inefficient.

Much has been written about the application of Artificial Intelligence in law. Recently, we've seen a number of products prove themselves in the market, most of them geared towards legal professionals (e-discovery, legal analytics, and legal

research). Below diagram shows different legal areas where currently AI has been able to involved with.

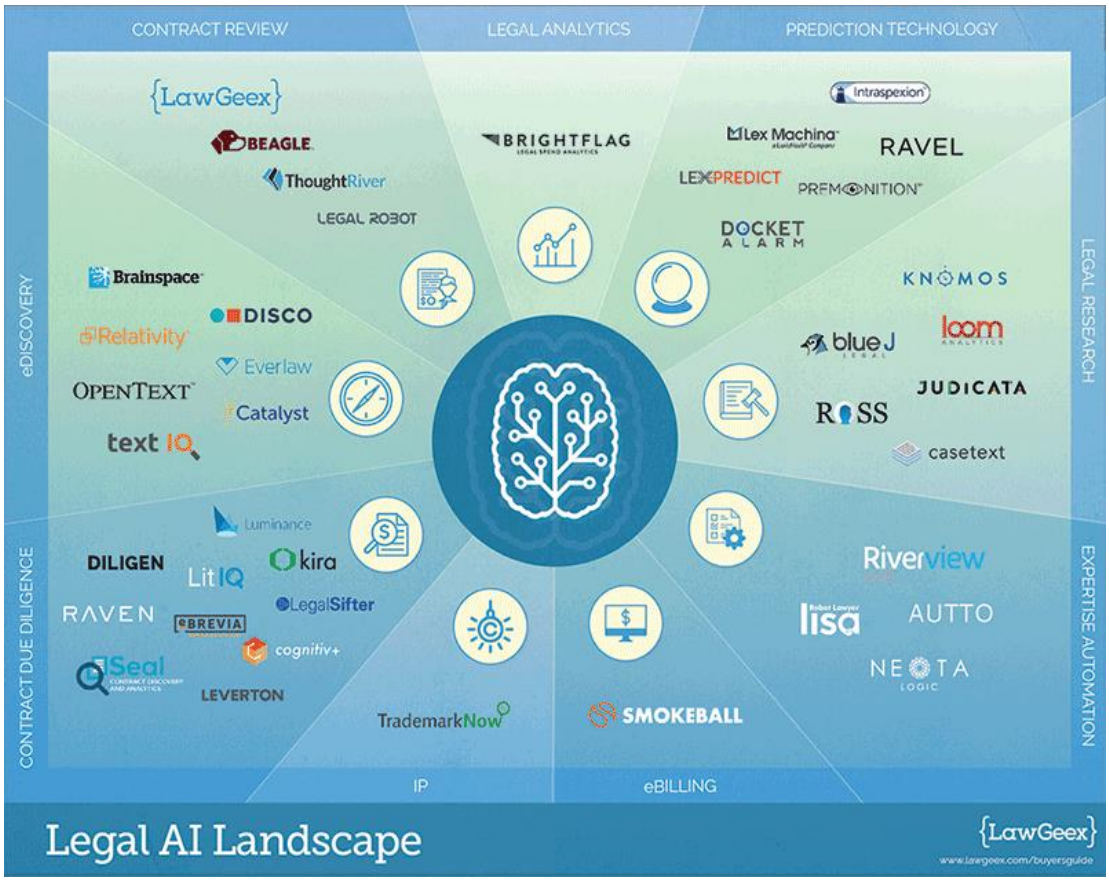


*Figure 1.3 AI involvement with law areas*

***But what about AI that directly benefits legal consumers?***

This is a question that is still not answered fully and a area still AI has not been able to do much with. Our solution is basically addressing this question.

And most importantly, there's no any single chatbot currently in Sri Lanka which provides legal assistance. So our chatbot will be the first to provide people with their legal solutions.

# 2. **OBJECTIVES**

## 2.1 Main Objective

Main objective of our research is to build a legal assistant chatbot where people can get their necessary legal information related to the areas our application supports. Our main target is to make it more user friendly so that it can analyses and understands the different ways and patterns of questions and provide them with every little detail of data they require. Aside of the chatbot, we provide a discussion forum where people can post their questions and answers.

## 2.2 Specific Objectives

1. Analyses and understands people's legal questions.
   - Chatbot tries to understand the question by mapping the keywords into the parameters. If the question is not clear and specific enough to map, it replies back with questions to clarify and narrow down to what user actually needs.
2. Adopts to the different situations and context.
   - Chatbot tries to adopt to the different patterns of asking the same question, when the context of the question changes and responds accordingly. He does this by trying to map the different values to the parameters.
3. Retrieve the necessary information from the data sources.
   - After mapping with the keywords, chatbot retrieves the necessary information matching those keywords from external API.
4. Documents downloading and provide directions to requested locations.
   - If there are any documents involved with the question provided by the user, our chatbot provides the user with the ability to download those documents. And if user requests for location directions that he needs to go to solve the related legal issue, chatbot will provide directions for that location.
5. People can use the discussion forum.
   - People can post their legal questions, others can answer them or vote to existing answers.In that way, people can exchange their ideas, their

experiences related to a certain legal issue. Peoples' answers will be rated based on votes.

# 3. METHODOLOGY

## 3.1 System Overview

User input is taken as text/voice to the android client and that is transferred as queries to our chatbot which is designed using 'Dialogflow', a web based bot development framework. If the user input involves data from an external source (ex: db), chatbot communicates with an external REST API written using PHP and retrieves the necessary information. If user input doesn't involve information from an external source, chatbot itself provides answers to the user. It has the ability to categorize and map the user input to the relevant intents. After it is mapped, if the input doesn't involve any data from the database then chatbot itself provides the answers through asking questions from the user. If input does involve data from an external source (ex: db), chatbot passes parameters which contain the mapped values to the rest

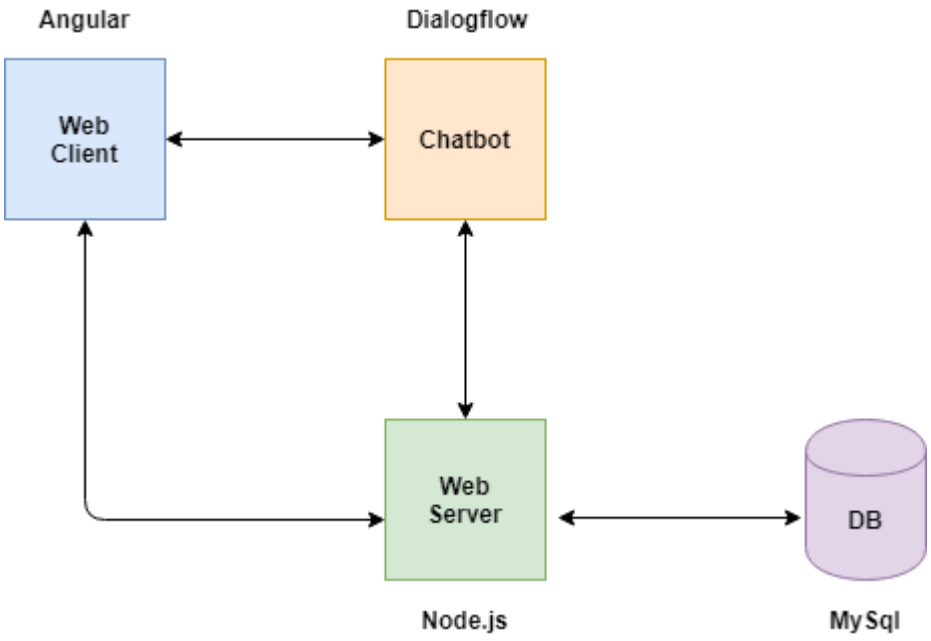


*Figure 3.1 System diagram*

## 3.2 Functionalities

### 3.2.1 Getting the user input

User input can be received as text/ voice and web client will transfer the user input as a text to the chatbot.

### 3.2.2 Analyzing and understanding the user input

User input is used to identify the relevant intent (user's area of interest). If chatbot couldn't get a clear understanding on user's intent, questions are asked by the chatbot to the user till it could clarify the actual problem of the user.

3.2.3 Allow the user to download the relevant documents and show the nearby legal places if requested

If user requests for some document related to a legal procedure (ex: when apply for a passport, travel document application) chatbot provides a link to download the documents. If the user requests for nearby legal locations (ex: police stations), google map directions will be sent to the user.

### 3.2.4 Discussion forum

As another function by the web client, a discussion forum is implemented for users to post their legal questions, and to answer those questions and vote the answers. Answers with the highest number of votes will be seen at the top.

## 3.3 Flow of the Project

We are going to use Waterfall Software Development Lifecycle for this project. All the details are mentioned below.

**Requirement Gathering and analyzing**

In this project, business requirements are gathering in this phase. General questions such as" Who is going to use the system? How will they use the system? What data should be input into the system? What data should be output by the system? "will be answered. By doing this we can identify and get an idea about how we should implement our system and also understand the practicality of the solution. Reading research articles, checking existing systems, talk with industry experience people will be some methodologies that we can use to gather information.

After gathering the information from all the team members, we will be analyzing data for their validity and the possibility of incorporating the requirements of the system to be developed. Requirements analysis involves frequent communication with system users to determine specific feature expectations, resolution of conflict etc. Finally, Requirement Specification document will be created and it will include all the functional non-functional requirements which serve the purpose of guideline for the next phase of the model.

**Design**

Design phase starts with the Requirement Specification document delivered by the requirement phase. These requirements map into an architecture. System Components, interfaces, and behaviors will be defined by this architecture. Also, this System Design helps in specifying hardware and system requirements.

The design phase is more important because without a proper foundation we can't do anything in this project. Identify the problems in the requirement document and identify how to solve them will be done in the last stage of this phase.

**Implementation**

After Requirement Specification document delivered, if we have our requirements clearly detailed and have identified our resources, the work is divided into modules/units and actual coding is started. We will assign each task to the team members and check the requirement document. For the implementation part, it will drive like an agile project but other phases will drive traditional waterfall model. This will be the longest phase of the software development life cycle.

**Testing**

- Unit Testing – Individual units/ components of a software are tested by each member who are developing it. The purpose is to validate that each unit of the software performs as designed. A unit is the smallest testable part of any software. It usually has one or a few inputs and usually a single output.

- Integration Testing- Individual units are combined and tested as a group and the purpose of this level of testing is to expose faults in the interaction between integrated units.

- System testing - This is a level of software testing where a complete and integrated software is tested. This test will evaluate the system's compliance with the specified requirements.

### 3.4 Tools and Technologies

#### 3.4.1 Tools

- Dialogflow
- MySQL Workbench
- Visual Studio Code

#### 3.4.2 Technologies

- Node.js
- Angular
- SQL

## 3.5 Gantt Chart

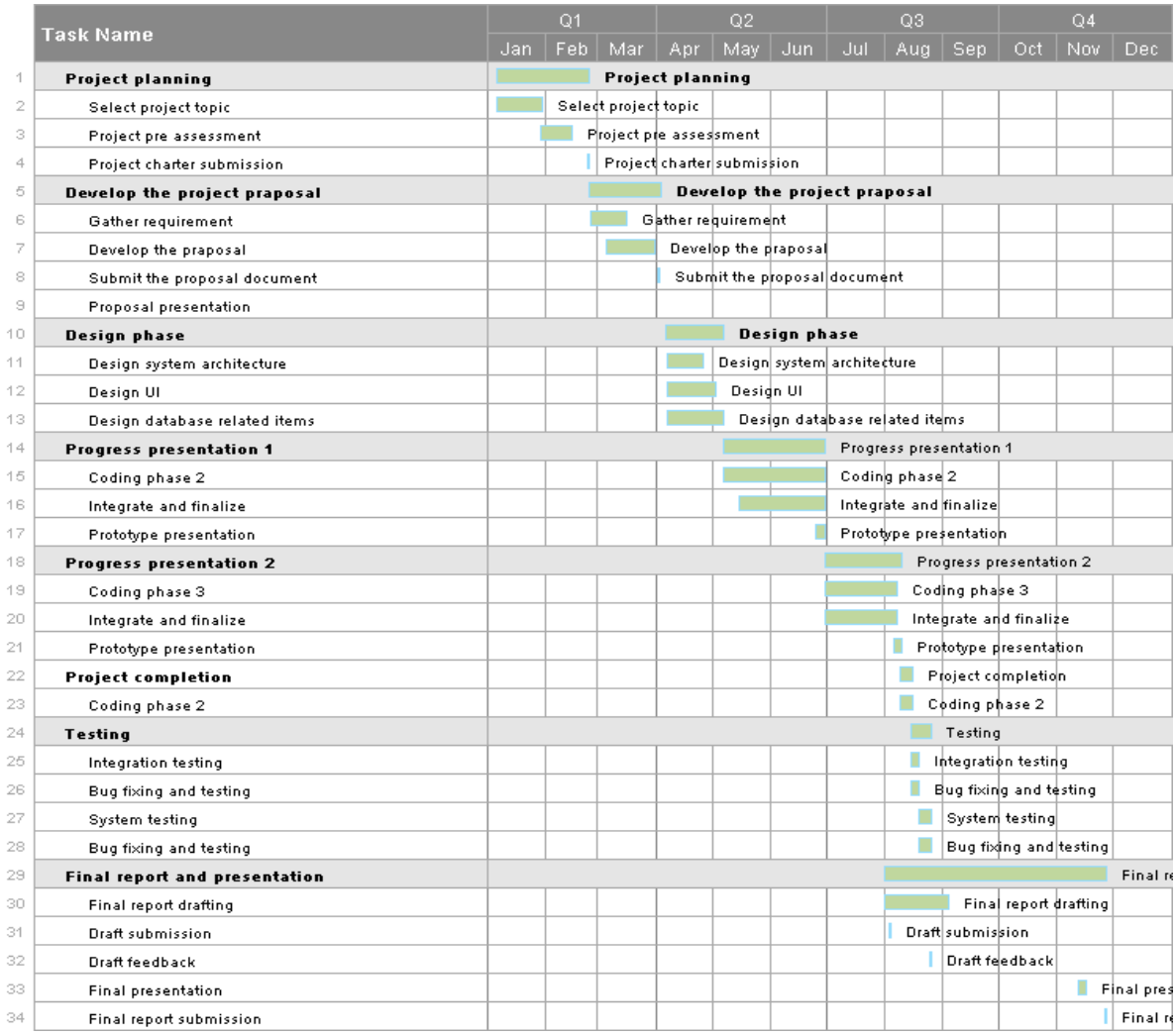


*Figure 3.5 Gantt chart*

## 4. DESCRIPTION OF PERSONAL AND FACILITIES

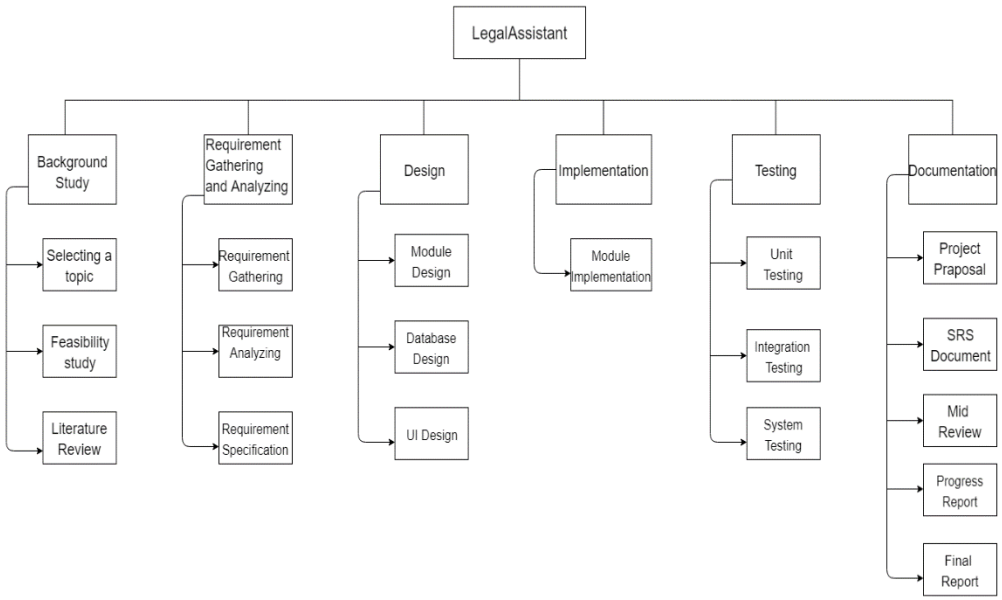


*Figure 4.1 Work break down structure*

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