

When it comes to geopolitics, few cities are as important in modern history as the German capital of Berlin. In a span of less than a century the city had transformed from the capital of a mighty empire, to an avant garde metropolis that exemplified the spirit of the Roaring Twenties, to the headquarters of an evil regime, to a (quite literally) divided city serving as a political and ideological battleground between the world's superpowers, to the reunified cosmopolitan city that it is today. However, it is an unfortunate fact that for many people Berlin's story ends with the Soviet Victory Flag being planted atop the parliament building. It was for this reason that I designed my chatbot, Charlie, to serve as a sort of tutor for some of the major events that happened in Berlin during the Cold War. In addition to being able to provide some basic information over the division of Berlin and Germany as a whole, Charlie is able to answer the user's questions over the Berlin Airlift (where the West supplied the isolated West Berlin via air for almost a year), the Berlin Wall, and the Berlin Crisis (a standoff between the United States and Soviet Union that threatened to start a Third World War).

Charlie was built using the dialogue engine Chatscript. Chatscript is a rules based language and dialogue engine that was developed by Bruce Wilcox and released in 2011. It is rules based in the sense that instead of using a corpus and machine learning or statistical analysis to create a language model, the bot's responses are decided using a set of predetermined hardcoded rules that fire as a result of the user's input setting off certain conditions. The conditions that the user must set off are not dissimilar from regular expressions, and in some cases regular expression symbols are used with the same or similar meaning. Although often overshadowed by chatbots made using statistical language processing or neural networks, rule based chatbots still have their uses and advantages over the other, more data and processing power hungry variates.

Chatscript treats conversations as being sequences of “volleys”. Volleys are simple, they consist of an input from one party, and the output of another. In order to ensure that the bot's contribution to the current volley is not pure nonsense, topic files are used to increase the odds that the bot's response is coherent and related to what was said before. The bot is organized in a somewhat hierarchical manner, with topic files being used to store the different rules that the bot operates by. These topics, just like the rules they contain, all have keywords associated with them which are used by the bot to determine what rule and/or topic is to be used to determine the output. The rules themselves come in different varieties, with the most important being “gambits” and “responders”. Responses are the most simple, they are simply rules that define an output that is printed after being given an input matching the criteria keyword(s). Gambits can be used by the bot to introduce a new topic of conversation, and can be output when a user's input matches the keywords of a topic, but does not match any responders. There are also rejoinders, which can be thought of as responders that are used only in response to a gambit. Another way to think of a rejoinder is as a sort of nested if statement where the gambit is the original if statement.

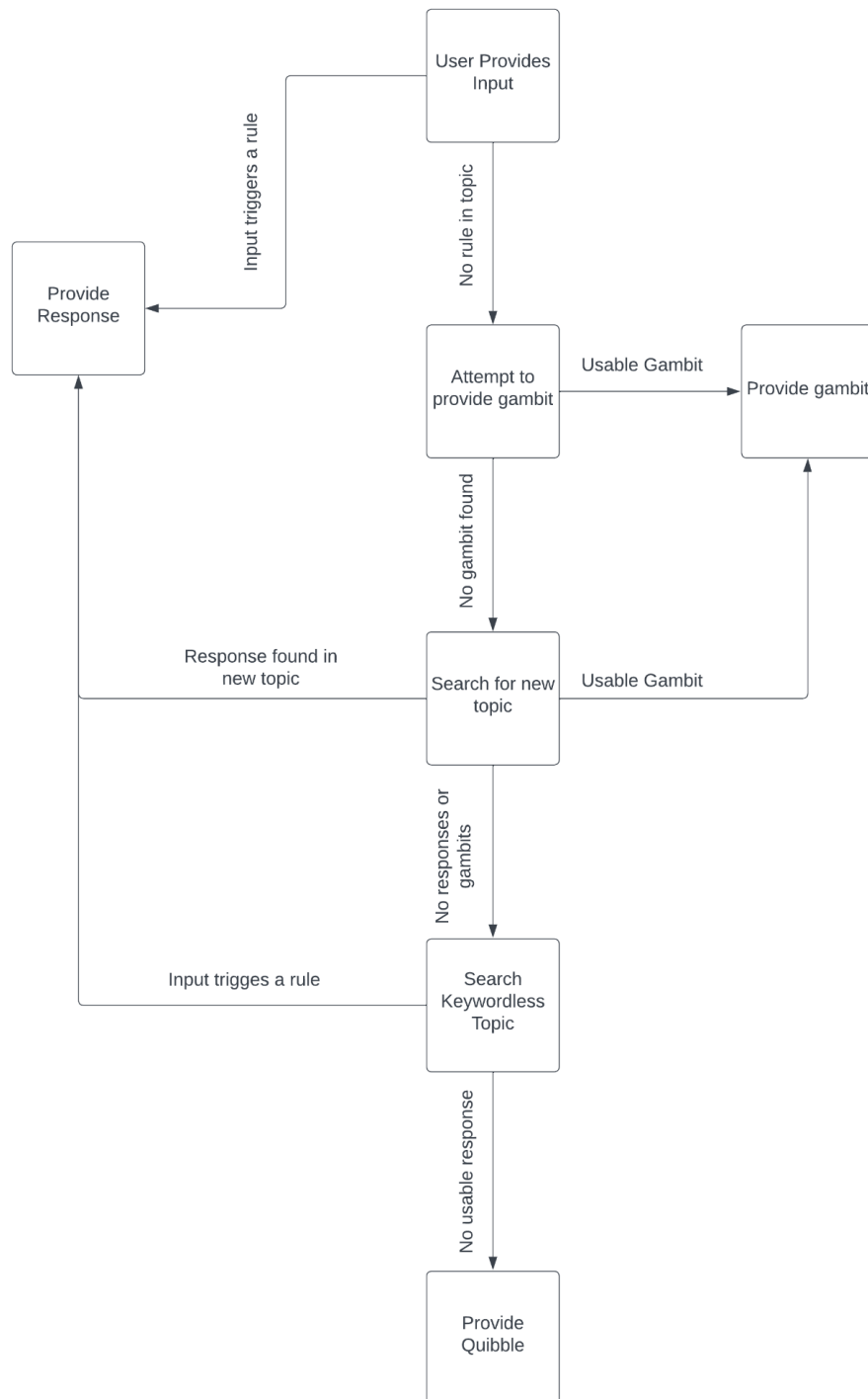
When the user provides an input sentence to the bot, the bot first checks to see if any of the responder rules are able to be fired with this input. If the bot is unable to find any responder rules, it will attempt to use a gambit either from the current topic or from a topic that is closely related (such as one who's keywords are also present in the input). Failing that, it will then make a last ditch effort by checking for responses in a special topic known as the “keywordless” topic that, as the name suggests, does not have any keywords needed to access it. If all of these have been checked and there is still no matching output, a quibble (a generic filler phrase) is printed instead.

Multiple NLP techniques are used by the chatbot in order for it to be able to do what it does. However, due to the inherent simplicity of rules based NLP systems, they are used in a slightly different way than other systems. The first is named entity recognition, which refers to the bots ability to recognize the names of specific places and historical events. This is a vital part of the bot. Since the majority of the programmed interactions with the bot are answers to questions the user has about places and points in history. This recognition comes from the keywords that are used to determine what rule or topic is the one to be used.

This also is possible thanks to taking advantage of Chatscript's language parsing capabilities. The user's input text is parsed to determine if any applicable keywords or patterns are detected. In addition, Chatscript's language parser is able to "unfold" contractions, and make use of an internal dictionary to account for common spelling mistakes and synonyms (for example, even if a keyword is "yes", both "yes" and "yeah" would work).

Finally, the bot can at several points ask the user questions, and their answers are saved to the user's user file. Chatscript maintains files for each user and bot conversation, which contain variables that store the responses for later use. Using these results, the bot's able to tailor some of its gambits to react more personally with the user.

# Logic Diagram



## Example Dialogues

CHARLIE: Hallo, I am Charlie. I'm here to teach you about what happened in Berlin during the Cold War. I have knowledge of East and West Berlin, the Berlin Wall, the Berlin Crisis of 1961, and the Berlin Airlift of 1948. What is your name?

noah: > Noah

CHARLIE: Hello, Noah!

noah: > who are you

CHARLIE: I am Charlie. I'm here to teach you about what happened in Berlin during the Cold War. I have knowledge of East and West Berlin, the Berlin Wall, the Berlin Crisis of 1961, and the Berlin Airlift of 1948.

noah: > what can you teach me?

CHARLIE: I have knowledge of East and West Berlin, the Berlin Wall, the Berlin Crisis of 1961, and the Berlin Airlift of 1948.

noah: > why are there two berlins?

CHARLIE: Berlin is the capital of Germany, located in the eastern part of the country. After World War 2 it, like Germany itself, was split into East and West Berlin.

noah: > what is east berlin?

CHARLIE: East Berlin was the part of Berlin that was under the control of the Soviet Union, and later East Germany.

noah: > and west berlin?

CHARLIE: West Berlin was the part of Berlin that was under the control of the Western Allies, and later West Germany.

noah: > i want to hear about the berlin crisis

CHARLIE: The Berlin Crisis of 1961 was a time of heightened political tension between the Western and Eastern Blocs, which came as a result of a Soviet ultimatum for the West to withdrawal military forces from Berlin. It culminated with a standoff of American and Soviet tanks at Checkpoint Charlie.

noah: > why

CHARLIE: Initial treaties ensured the right for Allied military personnel to move freely through both East and West Berlin, this was a barrier to the USSR's plan to solidify its hold on Germany.

noah: > what was the standoff

CHARLIE: During the crisis' peak, 10 American and Soviet tanks faced each other at Checkpoint Charlie. In addition, many infantry units were mobilized should a conflict erupt. As negotiations progressed, the tanks would slowly back away from each other meters at a time until they had all withdrawn.

noah: > what is the significance of this

CHARLIE: The Berlin Crisis represents one of the lowest points in American-Soviet relations, and directly lead to the division of Berlin using the Berlin wall.

noah: > what is this checkpoint charlie you keep talking about?

CHARLIE: Checkpoint Charlie is the name of a border checkpoint on the border of East and West Berlin. It was one of the few ways one could pass between the halves of the divided city.

noah: > berlin is fascinating

CHARLIE: Right.

noah: > tell me more about berlin

CHARLIE: Berlin is the capital of Germany, located in the eastern part of the country. After World War 2 it, like Germany itself, was split into East and West Berlin.

noah: > tell me more about germany

CHARLIE: Berlin is a beautiful city. Have you been?

noah: > yes

CHARLIE: Surely you agree then?

noah: > i want to hear about the airlift

CHARLIE: The Berlin Airlift was a period of time from summer 1948 to summer 1949 in which the Western Allies provided the isolated West Berlin with food and other supplies from the air.

noah: > how brave

CHARLIE: The Berlin Airlift was made possible through planes constantly landing at West Berlin airports and improvised landing strips. At one point, a plane was landing or taking off every 30 seconds.

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hase: > Hase
CHARLIE: Hello, Hase!
hase: > the berlin airlift is new to me
CHARLIE: If you were given the opportunity, would you risk World War III to feed the people who were just at war with you less than 5 years ago?
hase: > yes
CHARLIE: Many in the West felt similarly. In the eyes of the world the Berlin Airlift was a moral victory for the West over the USSR.
hase: > that's good to hear
CHARLIE: Many pilots and ground crew volunteered to assist in the airlift. From what it sounds like, you would have done the same.
hase: > tell me more about that
CHARLIE: The Berlin Airlift was a period of time from summer 1948 to summer 1949 in which the Western Allies provided the isolated West Berlin with food and other supplies from the air.
hase: > why was the city isolated?
CHARLIE: The Soviet Union had cut off all land routes to West Berlin in an effort to dissuade the west from introducing the Deutsche Mark to Western Occupied Germany and to abandon Berlin.
hase: > how long was the blockade?
CHARLIE: The Berlin Airlift was a period of time from summer 1948 to summer 1949 in which the Western Allies provided the isolated West Berlin with food and other supplies from the air.
hase: > who brought supplies?
CHARLIE: A little over 75% of the supplies were delivered by the United States. The United Kingdom (with assistance from Canada, Australia, New Zealand, and South Africa) delivered the remainder. France also assisted in maintaining the planes landed on French airstrips.
hase: > how much did they bring?
CHARLIE: Combined between the US Air Force and the Royal Air Force, 2,334,374 tons of supplies were delivered.
hase: > what about the wall?
CHARLIE: The Berlin Wall was built by East Germany to surround West Berlin from the rest of the country.
hase: > when was it built?
CHARLIE: The wall started construction on August 13th, 1961.
hase: > did people try to escape?
CHARLIE: While the wall was up, over 5,000 people escaped across the wall and over 200 died attempting to escape.
hase: > interesting
CHARLIE: Anything else you want to know Hase?

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## Knowledge Base

Due to the rules based and hard coded nature of the bot. It's difficult to have a singular knowledge base that the bot draws off of. Instead, the knowledge base consists of the responses that the bot responds with upon recognition of certain keywords or patterns.

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) At the start of the Cold War, the population was a little over 3 million, with 2.5 million being in West Berlin.
() East Berlin was the part of Berlin that was under the control of the Soviet Union, and later East Germany.
() West Berlin was the part of Berlin that was under the control of the Western Allies, and later West Germany.
eat() East Germany, also known as the German Democratic Republic (GDR), was a communist nation established by the USSR. It was part of the Eastern Bloc.
eat() West Germany, also known as the Federal Republic of Germany (FRG) was created from the American, British, and French occupation zones.
) The Cold War is the term for the period of time from 1947 to 1991 characterized by arms races, proxy wars, and geopolitical tension between the American lead Western Bloc and the Eastern Bloc.
eat() The Eastern Bloc was a group of communist or socialist nations that were aligned with the Soviet Union during the Cold War.
eat() The Western Bloc was a group of capitalist nations that were aligned with the United States during the Cold War.

```

```

Berlin is the capital of Germany, located in the eastern part of the country. After World War 2 it, like Germany itself, was split into East and West Berlin.

```

```

The Berlin Wall was built by East Germany to surround West Berlin from the rest of the country.
free enclave in East Germany, many East Germans used West Berlin as an escape route from the Eastern Bloc.

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```

^keep() ^repeat() The Berlin Wall was ordered by East Germany's Walter Ulbricht at the behest of Soviet premier Nikita Khrushchev.

```

```

p() ^repeat() The wall started construction on August 13th, 1961.

```

```

:() The Berlin Wall wall was 27 miles (around 45.5 kilometers) long.

```

```

keep() ^repeat() While the wall was up, over 5,000 people escaped across the wall and over 200 died attempting to escape.

```

```

) November 9th, 1989, due to the increasing amount of East Germans fleeing the country, the East German government announced a loosening of travel restrictions. Due to a misman Guenter Schabowski did not know when the changes would take effect. When asked, he said that they were in effect immediately.

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) ^repeat() Parts of the wall were left standing as a memorial in both Berlin and abroad. Artists from around the world were hired to paint significant portion of the wall.

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```

keep() ^repeat() The idea of the Cold War escalating into a nuclear war as result of 99 Luftballons floating over East Berlin was immortalized by the German band Nena.

```

## User Model

Chatscript contains different files for each user, these files are updated as they converse with the bot, and the data from them can later be recalled and used to tailor responses for the user.

```
$cs_language=ENGLISH
$shutup=1
$singleresponse=1
$botprompt=CHARLIE:
$userprompt=noah: >
$cs_control_main=~control
$cs_token=75726583
$cs_login=noah
$cs_bot=Charlie
$cs_randindex=1611
$cs_trace=0
$cs_time=0
$username=Noah
$visited=1
#`end variables
0 #set flags
#`end fact sets
#`end user facts 0

$username=Hase
$cs_time=0
$cs_trace=0
$cs_randindex=710
$cs_bot=Charlie
$cs_login=hase
$cs_token=75726583
$cs_control_main=~control
$userprompt=hase: >
$botprompt=CHARLIE:
$singleresponse=1
$shutup=1
#`end variables
0 #set flags
#`end fact sets
#`end user facts 0
```

## Evaluation

While rules based chatbots are a tried and true method, with some very excellent examples being made over the years. There are still some inherent flaws and weaknesses that this type of chatbot has. While rules for the bot are good at picking up the specific patterns that the user is likely to ask, it simply cannot account for every single variation of a question or statement the user has. As a result, the keywords and patterns must be somewhat vague, which can also bring the problem of some rules or topics accidentally being triggered when they were not

intended. However, due to how gambits are able to guide the user into talking about the current topic, the conversation is still able to recover and the bot can continue its job of educating the user about the historical hotspot of Cold War Berlin.