

## **I. Introduction**

The Travel Adviser Agent is a specialized agent who gives advice to Filipino travelers from the Philippines going to Denmark.

As a consequence of the COVID-19 Pandemic, the travel rules have been stricter to ensure the safety of the travelers and people in Denmark. As a result, travelers could have a hard time understanding all the rules since Denmark authorities imposed different travel rules from other countries. Therefore, to help Filipino travelers traveling from the Philippines to Denmark, the Travel Adviser Agent will ease the burden of gathering relevant travel information and recommendations for the user, and their family, if they plan to travel as a party of four.

The Denmark Travel Adviser Agent can do the following: (1) Retrieving relevant information from and for the user.; (2) Asking additional questions for more specific information to confirm user inputs.; and (3) Asking additional questions to give specific recommendations.

In the first capability, the Denmark TAA is capable of first asking the primary requirements to enter Denmark. If the user does not meet those requirements, the TAA will not ask more detailed questions. Also, the TAA can accommodate a party (family) that consists of four members.

The second capability, the TAA, can also ask for vital information such as the user's PCR/antigen test and vaccine to further confirm their validity. For example, suppose the user has negative PCR test results. In that case, the TAA will ask follow-up questions to confirm if the PCR test has been taken no more than 72 hours before the date of entry. On the other hand, if the user has a negative antigen test result, the TAA will give follow-up questions to confirm if the antigen test has been taken no more than 48 hours before the entry date.

Lastly, the TAA can also ask additional questions that could make its recommendation more specific. For instance, when it comes to visa requirements to prepare before entering Denmark, the TAA would ask additional questions such as the user's purpose in traveling and employment status. Because of this capability, the recommendation for the user's additional visa requirements to be prepared before entering Denmark could be more specific. Moreover, the TAA can also recommend guidelines about possible fines if a travel rule is violated.

## **II. Knowledge Base**

In creating the knowledge base for the Travel Advisor Agent, the group started with browsing the Internet for possible websites from where they could gather information about Denmark's various travel rules as of December 31, 2021. After some time, the group settled on using Denmark's official website concerning the COVID-19 Pandemic - Coronasmitte.dkn (2021). This website contains not only COVID-19 related information but also the different travel rules imposed by Danish authorities. Upon reading about the different rules, the group decided to group them according to the following: (1) profile information, (2) travel information, (3) travel requirements, and (4) travel rules. By grouping the rules based on these categories, the group gets an idea of the TAA's questions and the sequence in which they will be asked.

After grouping the rules, the group wrote them in IF-THEN forms. Then they wrote their possible Prolog translations upon arranging them based on the sequence in which the questions about them will be asked. While arranging the sequencing of TAA's questions, the group noticed that they should also include a list of possible requirements for visa processing, so the TAA would be able to advise it as part of the documents to be prepared before entering Denmark. The group searched for a list of Denmark's official visa requirements and added them to the travel requirements list. Finally, the group created the knowledge base using Prolog and started developing the TAA.

### III. Results and Analysis

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?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age?: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: y.
Faith, are you also a Citizen of Denmark? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: y.
Faith, are you fully vaccinated? (y/n): |: y.
Faith, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Faith, was it atleast 2 weeks since you received your final vaccination dose? (y.
Faith, was it no more than 12 months since you received your final vaccination y.

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=====
You are allowed to travel to Denmark.
=====

????????????????????????????????????????????????????????????
Additional Questions for Faith.
????????????????????????????????????????????????????????????
Faith, do you have a Danish residence permit? (y/n): |: n.

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Start of recommendation for Faith.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: |: c.

-You are exempted from providing a visa. You don't have to prepare any visa requirement.
Press any letter to continue: |: █
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*Figure 1. Conversation wherein the traveler is an individual who is also a citizen of Denmark*

Figure 1 shows a snippet of a conversation with the TAA wherein the traveler is an individual who is also a citizen of Denmark. Implementing this feature of the TAA was difficult for the group to figure out how it would be possible for the TAA not to repeatedly ask the user if they are also a citizen of Denmark considering Denmark is also considered an EU, EEA, and Nordic country. Furthermore, it was challenging for the group to make the backtracking right as we have an intermediary structure “ask/2” between the question and known.

The problem was solved by creating rules that will serve as a bridge to immediately know

the user as a Nordic, EEA, or EU. Consequently, adding other rules to disregard the possibility quickly and not ask if the user is still either from Nordic, EEA, or EU after knowing the user already declined in beforehand questions his/her citizenship included in their respective group of countries. As a result, users who are also citizens of Denmark or any EU, EEA, or Nordic country, are advised that they need not provide visas and prepare visa requirements; they are also not questioned anymore regarding additional visa requirements.

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?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age?: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): |: n.
Kriz, are you also a Citizen of an EU country? (y/n): |: n.
Kriz, are you also a Citizen of an EEA country? (y/n): |: n.
Kriz, do you have a valid visa? (y/n): |: y.
Kriz, are you going to Denmark as an OFW? (y/n): |: n.
Kriz, will you enter Denmark because of Business? (y/n): |: y.
Kriz, do you have a valid passport? (y/n): |: y.
Kriz, were you previously infected? (y/n): |: y.
Kriz, are you fully vaccinated? (y/n): |: y.
Kriz, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Kriz, was it atleast 2 weeks since you received your final vaccination dose? (yy.
Kriz, was it no more than 12 months since you received your final vaccination dy.

*****

=====
You are allowed to travel to Denmark.
=====

????????????????????????????????????????????????????????????
Additional Questions for Kriz.
????????????????????????????????????????????????????????????
Kriz, are you also a Citizen of a Schengen country? (y/n): |: n.
Kriz, are you employed? (y/n): |: y.
Kriz, will you be staying at a hotel? (y/n): |: n.
Kriz, have you travelled internationally before? (y/n): |: n.
Kriz, are you a family member of an EU Citizen? (y/n): |: n.
Kriz, do you have a Danish residence permit? (y/n): |: n.

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Start of recommendation for Kriz.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: |: c.

-You must prepare the ff. visa requirements:
(a) Completely filled out Denmark Schengen Visa application form
(b) ID Photos (conforming to ICAO standards)
(c) Passport (containing at least two empty pages for affixing visa stickers, issued within the last 10 years)
(d) Fingerprints
(e) Travel health insurance confirmation of minimum DKK 30,000 coverage within Denmark and the entire Schengen area
(f) Cover letter stating the purpose of visit to Denmark and itinerary
(g) Flight Itinerary with dates and flight numbers specifying entry and exit from Denmark
(h) Proof of civil status
(i) Proof of sufficient financial means for the period of stay in Denmark

-You must also prepare the ff. additional visa requirements:
Press any letter to continue: |: c.

Since you are employed:
Employment contract
Current bank statement of the latest 6 months
Leave permission from the employer
Income Tax Return (ITR) form or Certificate of Income Tax deducted at the source of salary

Since you are entering for business purposes:
Invitation letter from the Danish company you will be visiting and their
detailed address accompanied with the dates of your visit
A certificate from your employer stating/allowing your business travel
If there were previous trade relations between the two companies, proof/s of such events
Business bank statement of the latest 6 months
Memorandum and Article of Association in original certified copy (registered with joint-stock companies)
Trade License (first issued and present renewal)
Proprietorship/Partnership documents

-To prove you are fully vaccinated, you need to provide your vaccination certificates containing your Name,
Date of Birth, Name of Vaccine, and Dates of 1st jab and 2nd jab
Press any letter to continue: |:

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*Figure 2.1. Conversation wherein the traveler is an individual who is traveling for Business purposes*

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?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age?: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, are you going to Denmark as an OFW? (y/n): |: n.
Faith, will you enter Denmark as a Tourist/Visitor? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: y.
Faith, are you fully vaccinated? (y/n): |: y.
Faith, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Faith, was it atleast 2 weeks since you received your final vaccination dose? (y.
Faith, was it no more than 12 months since you received your final vaccination y.

*****

=====
You are allowed to travel to Denmark.
=====

????????????????????????????????????????????????????????????
Additional Questions for Faith.
????????????????????????????????????????????????????????????
Faith, are you also a Citizen of a Schengen country? (y/n): |: n.
Faith, are you employed? (y/n): |: y.
Faith, will you be staying at a hotel? (y/n): |: n.
Faith, have you travelled internationally before? (y/n): |: n.
Faith, are you a family member of an EU Citizen? (y/n): |: n.
Faith, do you have a Danish residence permit? (y/n): |: n.

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Start of recommendation for Faith.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: |: c.

-You must prepare the ff. visa requirements:
(a) Completely filled out Denmark Schengen Visa application form
(b) ID Photos (conforming to ICAO standards)
(c) Passport (containing at least two empty pages for affixing visa stickers, issued within the last 10 years)
(d) Fingerprints
(e) Travel health insurance confirmation of minimum DKK 30,000 coverage within Denmark and the entire Schengen area
(f) Cover letter stating the purpose of visit to Denmark and itinerary
(g) Flight Itinerary with dates and flight numbers specifying entry and exit from Denmark
(h) Proof of civil status
(i) Proof of sufficient financial means for the period of stay in Denmark

-You must also prepare the ff. additional visa requirements:
Press any letter to continue: |: c.

Since you are employed:
Employment contract
Current bank statement of the latest 6 months
Leave permission from the employer
Income Tax Return (ITR) form or Certificate of Income Tax deducted at the source of salary

Since you are a tourist:
Invitation letter from your family or friends in Denmark with the address and phone number, if applicable
Bank statement of the last 6 months

-To prove you are fully vaccinated, you need to provide your vaccination certificates containing your Name,
Date of Birth, Name of Vaccine, and Dates of 1st jab and 2nd jab
Press any letter to continue: |:

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*Figure 2.2. Conversation wherein the traveler is an individual who is traveling for Tourist purposes*

Figure 2.1 shows a part of a conversation with the TAA wherein the traveler's purpose is to do business in Denmark. The group successfully implemented this with ease because they included a part where the user will be asked if their purpose for traveling is to do business. By doing this, additional visa requirements for business purposes would be included in TAA's recommendation. Furthermore, because the traveler must prepare visa requirements, they are also asked further

questions on the additional questions portion regarding this matter. On the other hand, Figure 2.2 shows a part of a conversation with the TAA where the traveler's purpose for entering Denmark is to tour.

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?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age?: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, are you going to Denmark as an OFW? (y/n): |: n.
Faith, will you enter Denmark because of Business? (y/n): |: n.
Faith, will you enter Denmark as a Tourist/Visitor? (y/n): |: n.
Faith, will you enter Denmark as someone who is Returning? (y/n): |: n.
Faith, will you enter Denmark because of Medical reasons? (y/n): |: n.
Faith, will you enter Denmark because of Cultural, Sports, Religious, or Filmmn.
Faith, will you enter Denmark as a Member of Official Delegations? (y/n): |: n.
Faith, will you enter Denmark to Study, Train, Research, or to complete your Iny.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: y.
Faith, are you fully vaccinated? (y/n): |: y.
Faith, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Faith, was it atleast 2 weeks since you received your final vaccination dose? (y.
Faith, was it no more than 12 months since you received your final vaccination y.

*****
=====
You are allowed to travel to Denmark.
=====

????????????????????????????????????????????????????????????
Additional Questions for Faith.
????????????????????????????????????????????????????????????
Faith, are you also a Citizen of a Schengen country? (y/n): |: n.
Faith, are you employed? (y/n): |: n.
Faith, are you self-employed? (y/n): |: n.
Faith, are you a student? (y/n): |: y.
Faith, will you be staying at a hotel? (y/n): |: n.
Faith, have you travelled internationally before? (y/n): |: n.
Faith, are you a family member of an EU Citizen? (y/n): |: n.
Faith, do you have a Danish residence permit? (y/n): |: n.

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Start of recommendation for Faith.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: |: c.

-You must prepare the ff. visa requirements:
(a) Completely filled out Denmark Schengen Visa application form
(b) ID Photos (conforming to ICAO standards)
(c) Passport (containing at least two empty pages for affixing visa stickers, issued within the last 10 years)
(d) Fingerprints
(e) Travel health insurance confirmation of minimum DKK 30,000 coverage within Denmark and the entire Schengen area
(f) Cover letter stating the purpose of visit to Denmark and itinerary
(g) Flight Itinerary with dates and flight numbers specifying entry and exit from Denmark
(h) Proof of civil status
(i) Proof of sufficient financial means for the period of stay in Denmark

-You must also prepare the ff. additional visa requirements:
Press any letter to continue: |: c.

Since you are a student:
Proof of enrollment
No-objection certificate from school or university

Since you are entering for educational purposes:
An enrollment certificate allowing attendance of courses
Certificate of completion or courses attended
Financial sustenance document

-To prove you are fully vaccinated, you need to provide your vaccination certificates containing your Name,
Date of Birth, Name of Vaccine, and Dates of 1st jab and 2nd jab
Press any letter to continue: |: █

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*Figure 3.1. Conversation wherein the TAA asks about a traveler's COVID-19 vaccination status*

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?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age?|: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): |: n.
Kriz, are you also a Citizen of an EU country? (y/n): |: n.
Kriz, are you also a Citizen of an EEA country? (y/n): |: n.
Kriz, do you have a valid visa? (y/n): |: y.
Kriz, are you going to Denmark as an OFW? (y/n): |: n.
Kriz, will you enter Denmark because of Business? (y/n): |: y.
Kriz, do you have a valid passport? (y/n): |: y.
Kriz, were you previously infected? (y/n): |: y.
Kriz, are you fully vaccinated? (y/n): |: y.
Kriz, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: n.
Kriz, is your first COVID-19 vaccine dose from Johnson & Johnson? (y/n): |: n.
Kriz, is your first COVID-19 vaccine dose from Moderna? (y/n): |: n.
Kriz, is your first COVID-19 dose from AstraZeneca? (y/n): |: n.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true .

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age?|: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): |: n.
Kriz, are you also a Citizen of an EU country? (y/n): |: n.
Kriz, are you also a Citizen of an EEA country? (y/n): |: n.
Kriz, do you have a valid visa? (y/n): |: y.
Kriz, are you going to Denmark as an OFW? (y/n): |: n.
Kriz, will you enter Denmark because of Business? (y/n): |: y.
Kriz, do you have a valid passport? (y/n): |: y.
Kriz, were you previously infected? (y/n): |: y.
Kriz, are you fully vaccinated? (y/n): |: y.
Kriz, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Kriz, was it atleast 2 weeks since you received your final vaccination dose? (yn.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true .

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*Figure 3.2. Some sample conversations wherein the traveler's COVID-19 vaccination status is invalid*



Figure 3.1 shows a part of a conversation where the traveler is asked about the status of their COVID-19 vaccination. Furthermore, to ensure that their COVID-19 vaccination is valid, the TAA asks additional questions regarding the vaccine brand and the number of weeks/ months after their final dose. For this part, it is assumed that the first dose is similar to the second dose, which would therefore be valid; however, an exception would be if the first dose is Astrazeneca, then further questions about the second dose will be asked. As seen in Figure 3.2, if the traveler answers any of the additional vaccination questions with a no, the TAA would print that they cannot enter Denmark, and the program will end. The group implemented these features using the AND operator, OR operator, and the cut operator to avoid backtracking. Consequently, the TAA could recommend ways for the user to prove that they are fully vaccinated as one of the requirements to be prepared before entering Denmark.

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?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'
What is your age?: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, are you going to Denmark as an OFW? (y/n): |: n.
Faith, will you enter Denmark because of Business? (y/n): |: n.
Faith, will you enter Denmark as a Tourist/Visitor? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: n.
Faith, are you physically disabled? (y/n): |: n.
Faith, are you mentally disabled? (y/n): |: n.
Faith, do you have hemophilia? (y/n): |: y.
Faith, are you fully vaccinated? (y/n): |: y.
Faith, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Faith, was it atleast 2 weeks since you received your final vaccination dose? (y.
Faith, was it no more than 12 months since you received your final vaccination y.

*****

=====
You are allowed to travel to Denmark.
=====

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Start of recommendation for Faith.
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: |: c.

-You must prepare the ff. visa requirements:
(a) Completely filled out Denmark Schengen Visa application form
(b) ID Photos (conforming to ICAO standards)
(c) Passport (containing at least two empty pages for affixing visa stickers, issued within the last 10 years)
(d) Fingerprints
(e) Travel health insurance confirmation of minimum DKK 30,000 coverage within Denmark and the entire Schengen area
(f) Cover letter stating the purpose of visit to Denmark and itinerary
(g) Flight Itinerary with dates and flight numbers specifying entry and exit from Denmark
(h) Proof of civil status
(i) Proof of sufficient financial means for the period of stay in Denmark

-You must also prepare the ff. additional visa requirements:
Press any letter to continue: |: c.

Since you are self-employed:
A copy of your business license
Company bank statement of the latest 6 months
Income Tax Return (ITR)

Since you are a tourist:
Invitation letter from your family or friends in Denmark with the address and phone number, if applicable
Bank statement of the last 6 months

-To prove you are fully vaccinated, you need to provide your vaccination certificates containing your Name,
Date of Birth, Name of Vaccine, and Dates of 1st jab and 2nd jab
Press any letter to continue: |: c.

-You are not required to present negative antigen or PCR test/s to travel to Denmark.
Press any letter to continue: |:

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*Figure 4.1. Some parts of a conversation wherein the TAA asks about a traveler's possible exemption from taking a PCR/antigen test and the traveler is exempted*

```

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age?: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): | : n.
Kriz, are you also a Citizen of an EU country? (y/n): | : n.
Kriz, are you also a Citizen of an EEA country? (y/n): | : n.
Kriz, do you have a valid visa? (y/n): | : y.
Kriz, are you going to Denmark as an OFW? (y/n): | : n.
Kriz, will you enter Denmark because of Business? (y/n): | : y.
Kriz, do you have a valid passport? (y/n): | : y.
Kriz, were you previously infected? (y/n): | : n.
Kriz, are you physically disabled? (y/n): | : n.
Kriz, are you mentally disabled? (y/n): | : n.
Kriz, do you have hemophilia? (y/n): | : n.
Kriz, are you in risk of bleeding? (y/n): | : n.
Kriz, do you have a broken nose? (y/n): | : n.
Kriz, have you had a nasal surgery? (y/n): | : n.
Kriz, do you have cancer? (y/n): | : n.
Kriz, do you have sequelae after cancer? (y/n): | : n.
Kriz, do you have narrow nasal passage? (y/n): | : n.
Kriz, do you have a Danish residence permit? (y/n): | : n.
Kriz, are you an active aircrew member? (y/n): | : n.
Kriz, are you a passive aircrew member? (y/n): | : n.
Kriz, are you entering Denmark for cargo transport purposes? (y/n): | : n.
Kriz, are you a person who departed from Denmark within 24 hours before enterinn.
Kriz, is your COVID-19 test negative? (y/n): | : y.
Kriz, did you take an antigen test? (y/n): | : y.
Kriz, did you take the antigen test no more than 48 hours before the date you wy.
Kriz, are you fully vaccinated? (y/n): | : y.
Kriz, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): | : y.
Kriz, was it atleast 2 weeks since you received your final vaccination dose? (yy.
Kriz, was it no more than 12 months since you received your final vaccination dy.

#####
Start of recommendation for Kriz.
#####
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: | : c.

-You must prepare the ff. visa requirements:
(a) Completely filled out Denmark Schengen Visa application form
(b) ID Photos (conforming to ICAO standards)
(c) Passport (containing at least two empty pages for affixing visa stickers, issued within the last 10 years)
(d) Fingerprints
(e) Travel health insurance confirmation of minimum DKK 30,000 coverage within Denmark and the entire Schengen area
(f) Cover letter stating the purpose of visit to Denmark and itinerary
(g) Flight Itinerary with dates and flight numbers specifying entry and exit from Denmark
(h) Proof of civil status
(i) Proof of sufficient financial means for the period of stay in Denmark

-You must also prepare the ff. additional visa requirements:
Press any letter to continue: | : c.

Since you are employed:
Employment contract
Current bank statement of the latest 6 months
Leave permission from the employer
Income Tax Return (ITR) form or Certificate of Income Tax deducted at the source of salary

Since you are entering for business purposes:
Invitation letter from the Danish company you will be visiting and their
detailed address accompanied with the dates of your visit
A certificate from your employer stating/allowing your business travel
If there were previous trade relations between the two companies, proof/s of such events
Business bank statement of the latest 6 months
Memorandum and Article of Association in original certified copy (registered with joint-stock companies)
Trade License (first issued and present renewal)
Proprietorship/Partnership documents

-To prove you are fully vaccinated, you need to provide your vaccination certificates containing your Name,
Date of Birth, Name of Vaccine, and Dates of 1st jab and 2nd jab
Press any letter to continue: | : c.

-To prove that you have taken a PCR/antigen test, you can download and print your test results from sundhed.dk or in the Coronapas app.
Press any letter to continue: | : c.

```

*Figure 4.2. Some parts of a conversation wherein the TAA asks about a traveler's possible exemption from taking a PCR/antigen test and the traveler is not exempted and should provide proof of taking a negative COVID-19 test*

```

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age?: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, are you going to Denmark as an OFW? (y/n): |: n.
Faith, will you enter Denmark because of Business? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: n.
Faith, are you physically disabled? (y/n): |: n.
Faith, are you mentally disabled? (y/n): |: n.
Faith, do you have hemophilia? (y/n): |: n.
Faith, are you in risk of bleeding? (y/n): |: n.
Faith, do you have a broken nose? (y/n): |: n.
Faith, have you had a nasal surgery? (y/n): |: n.
Faith, do you have cancer? (y/n): |: n.
Faith, do you have sequelae after cancer? (y/n): |: n.
Faith, do you have narrow nasal passage? (y/n): |: n.
Faith, do you have a Danish residence permit? (y/n): |: n.
Faith, are you an active aircrew member? (y/n): |: n.
Faith, are you a passive aircrew member? (y/n): |: n.
Faith, are you entering Denmark for cargo transport purposes? (y/n): |: n.
Faith, are you a person who departed from Denmark within 24 hours before enterin.
Faith, is your COVID-19 test negative? (y/n): |: y.
Faith, did you take an antigen test? (y/n): |: y.
Faith, did you take the antigen test no more than 48 hours before the date you n.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true .

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age?: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, are you going to Denmark as an OFW? (y/n): |: n.
Faith, will you enter Denmark because of Business? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: n.
Faith, are you physically disabled? (y/n): |: n.
Faith, are you mentally disabled? (y/n): |: n.
Faith, do you have hemophilia? (y/n): |: n.
Faith, are you in risk of bleeding? (y/n): |: n.
Faith, do you have a broken nose? (y/n): |: n.
Faith, have you had a nasal surgery? (y/n): |: n.
Faith, do you have cancer? (y/n): |: n.
Faith, do you have sequelae after cancer? (y/n): |: n.
Faith, do you have narrow nasal passage? (y/n): |: n.
Faith, do you have a Danish residence permit? (y/n): |: n.
Faith, are you an active aircrew member? (y/n): |: n.
Faith, are you a passive aircrew member? (y/n): |: n.
Faith, are you entering Denmark for cargo transport purposes? (y/n): |: n.
Faith, are you a person who departed from Denmark within 24 hours before enterin.
Faith, is your COVID-19 test negative? (y/n): |: n.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true .

```

*Figure 4.3. Some sample conversations wherein the traveler's COVID-19 test status is invalid*

Figure 4.1 shows some parts of a conversation with the TAA where the user is asked questions that might exempt them from taking a PCR/antigen test; before asking if they are fully vaccinated and after asking if they have a valid passport. The group implemented this using the

AND operator, OR operator, Not operator, cut operator, and the if-then-else construct (->). If they are liable for taking a PCR/antigen test, the TAA would recommend that the user present proof that they took a PCR/antigen test that came back negative, as shown in Figure 4.2. To ensure that the PCR/antigen test is valid, the TAA will ask further questions regarding the kind of test, its result, and the number of hours after the test was administered. If the user answers with a no, the TAA will print that they cannot enter Denmark, and the program will end, as seen in Figure 4.3.

```
?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): y.
How many individuals are in the travel party? |: 2.
Is your family's travel purpose to tour in Denmark? (y/n): |: y.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age? |: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: y.
Faith, are you fully vaccinated? (y/n): |: y.
Faith, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Faith, was it atleast 2 weeks since you received your final vaccination dose? (y.
Faith, was it no more than 12 months since you received your final vaccination y.

*****
What is your name? (since this is a String, put it in between quotation marks): 'Aragorn'.
What is your age? |: 30.

Aragorn, are you also a Citizen of a Nordic country? (y/n): |: n.
Aragorn, are you also a Citizen of an EU country? (y/n): |: n.
Aragorn, are you also a Citizen of an EEA country? (y/n): |: n.
Aragorn, do you have a valid visa? (y/n): |: y.
Aragorn, do you have a valid passport? (y/n): |: y.
Aragorn, were you previously infected? (y/n): |: y.
Aragorn, are you fully vaccinated? (y/n): |: y.
Aragorn, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Aragorn, was it atleast 2 weeks since you received your final vaccination dose? y.
Aragorn, was it no more than 12 months since you received your final vaccinatoy.

*****

=====
You are allowed to travel to Denmark.
=====
```

*Figure 5.1. Parts of a conversation with the TAA where the user is part of a group*

```

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): y.
How many individuals are in the travel party? |: 2.
Is your family's travel purpose to tour in Denmark? (y/n): |: n.
Are you returning residents? (y/n): |: n.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true.

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): y.
How many individuals are in the travel party? |: 2.
Is your family's travel purpose to tour in Denmark? (y/n): |: n.
Are you returning residents? (y/n): |: y.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age? |: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): |: n.
Kriz, are you also a Citizen of an EU country? (y/n): |: n.
Kriz, are you also a Citizen of an EEA country? (y/n): |: n.
Kriz, do you have a valid visa? (y/n): |: y.
Kriz, do you have a valid passport? (y/n): |: y.
Kriz, were you previously infected? (y/n): |: y.
Kriz, are you fully vaccinated? (y/n): |: y.
Kriz, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Kriz, was it atleast 2 weeks since you received your final vaccination dose? (yy.
Kriz, was it no more than 12 months since you received your final vaccination dy.

*****
What is your name? (since this is a String, put it in between quotation marks): 'Dahyun'.
What is your age? |: 23.

Dahyun, are you also a Citizen of a Nordic country? (y/n): |: n.
Dahyun, are you also a Citizen of an EU country? (y/n): |: n.
Dahyun, are you also a Citizen of an EEA country? (y/n): |: n.
Dahyun, do you have a valid visa? (y/n): |: n.
Dahyun, do you have a valid passport? (y/n): |: n.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true.

```

*Figure 5.2. Sample conversations wherein the group is not allowed to enter Denmark*

Figure 5.1 shows parts of a conversation with the TAA where the user is part of a group of different ages and their purpose is to tour Denmark. This feature was implemented so that the travel party members would be asked about their information one by one. The group had a difficult time implementing this part because they wanted to make sure that if the group's representative answered the question of whether their purpose of traveling was to tour with a no, they would then be asked if they are traveling to Denmark as returning residents. If the user answers both travel

purposes with a no, the TAA will print that they are not allowed to enter Denmark, and the program will end as seen in Figure 5.2. The group solved this by using `asserta()` to assert that the user is part of a group. The purpose they will travel should also be asserted depending on their answer. If the group's travel purpose is to tour, this purpose will be asserted into the knowledge base. On the other hand, if they travel as returning residents, this purpose will be asserted into the knowledge base. However, if the group answered both questions with a no, then no fact about their travel purpose could be asserted into the knowledge base, and the fail predicate is imposed. The TAA will print that they are not allowed to enter Denmark.

```

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Faith'.
What is your age? |: 20.

Faith, are you also a Citizen of a Nordic country? (y/n): |: n.
Faith, are you also a Citizen of an EU country? (y/n): |: n.
Faith, are you also a Citizen of an EEA country? (y/n): |: n.
Faith, do you have a valid visa? (y/n): |: y.
Faith, are you going to Denmark as an OFW? (y/n): |: y.
Faith, will you enter Denmark as a Tourist/Visitor? (y/n): |: n.
Faith, will you enter Denmark as someone who is Returning? (y/n): |: n.
Faith, will you enter Denmark because of Business? (y/n): |: y.
Faith, do you have a valid passport? (y/n): |: y.
Faith, were you previously infected? (y/n): |: y.
Faith, are you fully vaccinated? (y/n): |: y.
Faith, is your first COVID-19 vaccine dose from Pfizer-BioNTech? (y/n): |: y.
Faith, was it atleast 2 weeks since you received your final vaccination dose? (y.
Faith, was it no more than 12 months since you received your final vaccination y.

*****

=====
You are allowed to travel to Denmark.
=====

```

---

```

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
Start of recommendation for Faith
@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
List of guidelines you have to follow and documents you have to prepare BEFORE entering Denmark:
-Passport
Press any letter to continue: |: c.

-You must prepare the ff. visa requirements:
(a) Completely filled out Denmark Schengen Visa application form
(b) ID Photos (conforming to ICAO standards)
(c) Passport (containing at least two empty pages for affixing visa stickers, issued within the last 10 years)
(d) Fingerprints
(e) Travel health insurance confirmation of minimum DKK 30,000 coverage within Denmark and the entire Schengen area
(f) Cover letter stating the purpose of visit to Denmark and itinerary
(g) Flight Itinerary with dates and flight numbers specifying entry and exit from Denmark
(h) Proof of civil status
(i) Proof of sufficient financial means for the period of stay in Denmark

-You must also prepare the ff. additional visa requirements:
Press any letter to continue: |: c.

Since you are employed:
Employment contract
Current bank statement of the latest 6 months
Leave permission from the employer
Income Tax Return (ITR) form or Certificate of Income Tax deducted at the source of salary

Since you are entering for business purposes:
Invitation letter from the Danish company you will be visiting and their
detailed address accompanied with the dates of your visit
A certificate from your employer stating/allowing your business travel
If there were previous trade relations between the two companies, proof/s of such events
Business bank statement of the latest 6 months
Memorandum and Article of Association in original certified copy (registered with joint-stock companies)
Trade License (first issued and present renewal)
Proprietorship/Partnership documents

Since you are an OFW to be working on Denmark:
Personal appearance of employer or person authorized to sign for the company
Original and photocopy of passport data page of employer or person authorized to sign for the company
For corporation: proof of authority of person authorized to sign for the company
Original employment contract
Photocopy of passport data page of employee
Proof that employee can obtain work permit/long-stay visa
Original and photocopy of valid commercial registration and business license notarized in English and legalized by Danish Ministry of Foreign Affairs
Service and expedited fee of DKK262.50 per document, in exact amount, in Danish kroner only. Payment via instant bank transfer preferred.
Account details will be provided at the Embassy processing counter on the date of your appearance.
Note: Please bring all requirements including the requisite photocopies when submitting documents.
There are no photocopying services in the Embassy.

-To prove you are fully vaccinated, you need to provide your vaccination certificates containing your Name,
Date of Birth, Name of Vaccine, and Dates of 1st jab and 2nd jab
Press any letter to continue: |:

```

*Figure 6.1. Parts of a conversation where the traveler is an OFW*



```

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age? |: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): |: n.
Kriz, are you also a Citizen of an EU country? (y/n): |: n.
Kriz, are you also a Citizen of an EEA country? (y/n): |: n.
Kriz, do you have a valid visa? (y/n): |: y.
Kriz, are you going to Denmark as an OFW? (y/n): |: y.
Kriz, will you enter Denmark as a Tourist/Visitor? (y/n): |: y.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true .

?- start.
Travel Advisor Agent for Denmark.

Are you going to travel as a party? (y/n): n.
What is your name? (since this is a String, put it in between quotation marks): 'Kriz'.
What is your age? |: 20.

Kriz, are you also a Citizen of a Nordic country? (y/n): |: n.
Kriz, are you also a Citizen of an EU country? (y/n): |: n.
Kriz, are you also a Citizen of an EEA country? (y/n): |: n.
Kriz, do you have a valid visa? (y/n): |: y.
Kriz, are you going to Denmark as an OFW? (y/n): |: y.
Kriz, will you enter Denmark as a Tourist/Visitor? (y/n): |: n.
Kriz, will you enter Denmark as someone who is Returning? (y/n): |: n.
Kriz, will you enter Denmark because of Business? (y/n): |: n.
=====
Sorry, you are not allowed to travel to Denmark.
=====

Thanks for using our system :)
true .

```

*Figure 6.2. Some sample conversations where the traveler is an OFW but their visa purpose is not business*

Figure 6.1 shows parts of a conversation with the TAA where the user is an OFW. This feature was implemented so that if the user is traveling as an OFW, their visa purpose should be business. With this implementation, the TAA would print that they cannot enter Denmark. The program will end if they answer other travel purposes with a yes or if they answer with a no when asked if their purpose to travel is for business, as seen in Figure 6.2. The group implemented this by adding an if-then-else construct that would check if the dynamic fact called `known`, with an arity of three, contains a fact that the user is an OFW. It should also contain the fact that the user's purpose for traveling is business; otherwise, a fail predicate will be implemented.

## **IV. Conclusions and Recommendations**

### **Summary**

The group used Prolog to create a Travel Adviser Agent, a specialized agent that can advise Filipino travelers from the Philippines as they plan to travel to Denmark. Most predicates are in the form of questions; after they are asked, they will be asserted as either true or false.

### **Strengths**

1. Easy retrieval of user needed information by constructing and implementing yes-no questions.
2. Capability to ask relevant follow-up questions to give users more detailed recommendations and further prove their answers' validity.
3. Since we can retrieve all possible solutions in a single line of code through backward chaining, we find it more reliable going through each solution instead of the usual format of for-loop where missing an entry or going beyond the array happens.

### **Weaknesses**

1. The Knowledge Base will not update the latest travel rules and information.
2. Unintuitive for non-programming people.
3. Inaccessible to the public.
4. Users need to install SWI-Prolog before being able to use it.
5. Users need to enter their names with quotation marks so that Prolog will understand them.
6. Questions regarding additional visa requirements based on the purpose of travel were limited to those that would cater to the most frequent visa purposes (Denmark Visa Application Requirements, n.d.).

### **Recommendations**

1. Accommodate more countries as destinations.
2. Accommodate more Nationalities.
3. Accommodate a greater number of people at a party.
4. Accommodate other parties aside from a family.
5. Make the Knowledge Base capable of being automatically updated to have the latest travel rules.
6. Include more specific rules into the Knowledge Base, such as other requirements for other types of visa purposes.
7. Allow ways in which users could store the results of their consultations (using files).
8. Add a graphical user interface to make it more user-friendly.
9. Make the Travel Adviser Agent publicly available through a website or app.

## V. References

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## VI. Google drive link

[https://drive.google.com/drive/folders/1WPGk\\_K9vZJhrnVO5XhoF1CWxUqQZ25fp?usp=sharing](https://drive.google.com/drive/folders/1WPGk_K9vZJhrnVO5XhoF1CWxUqQZ25fp?usp=sharing)

## VII. Appendix. Contribution of Members

Name	Detailed Contributions
Griffin, Faith Juliamae O.	Researching about Denmark's travel rules, Writing of the Source Code in Prolog, Writing of the Technical Report
Tahimic, Kriz Royce A.	Researching about Denmark's travel rules, Writing of the Source Code in Prolog, Writing of the Technical Report