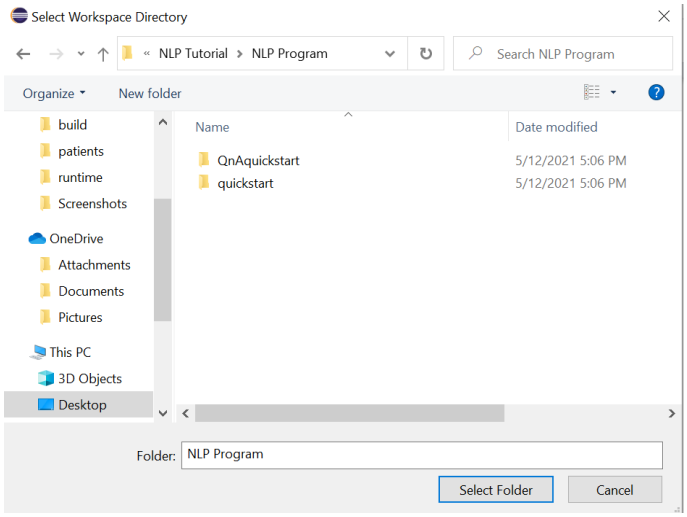
Getting Started

Download the following dependencies

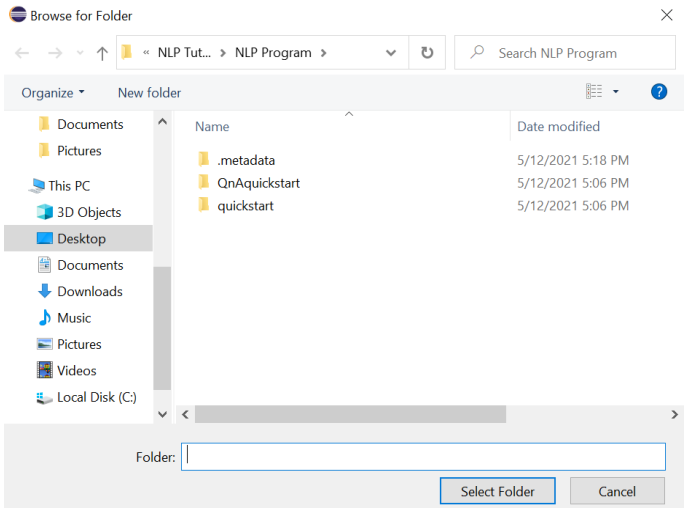
- Eclipse
- Java 8/ JFK 8

Setting up the NLP Program

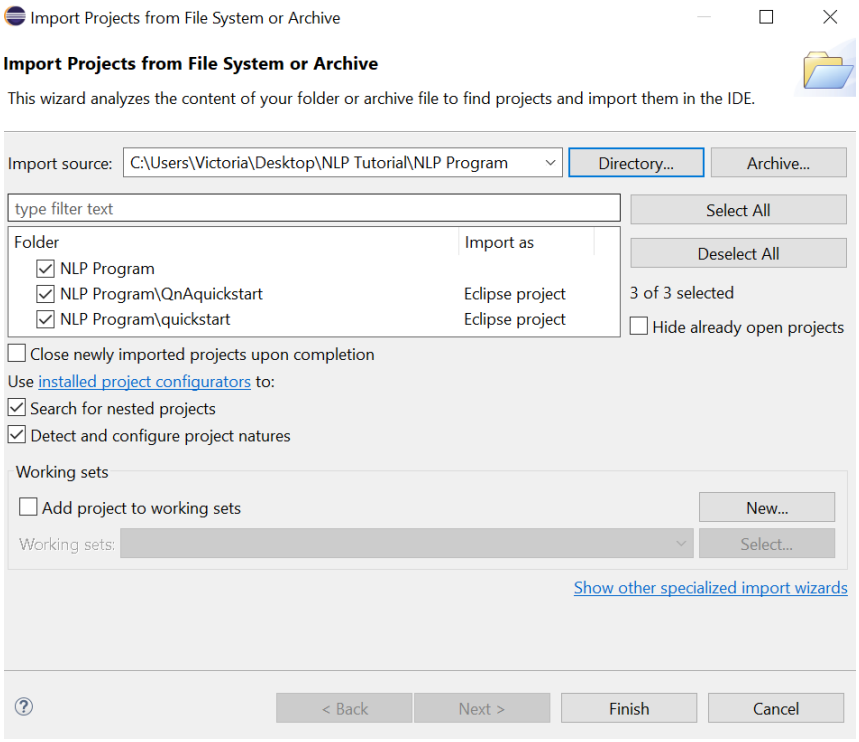
1. Download and extract the NLP Program zip file.
2. Open Eclipse and click Browse.
3. Navigate to the extracted NLP Program to reach the screen below. Click “Select Folder.”



4. Click “Launch.” Close the welcome tab.
5. Click “File” and “Open Projects From File System.”
6. Click” Directory” and check to see if you’re in the “NLP Program folder” as shown.

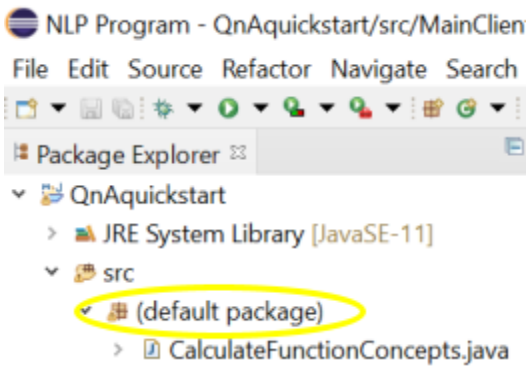


7. Make sure all folders are selected as shown below. Click “Finish.”



8. Wait a minute for the program to build. All the dependencies and environment set-up has been done on the maven/pom. You may see errors at first but will resolve once Eclipse finishes the set up.
9. On the Package Explorer, navigate in the “QnAquickstart” to the “default package”. Click on “MainClient.java”

   If you’re on a Mac, please use MainClientMacs.java.

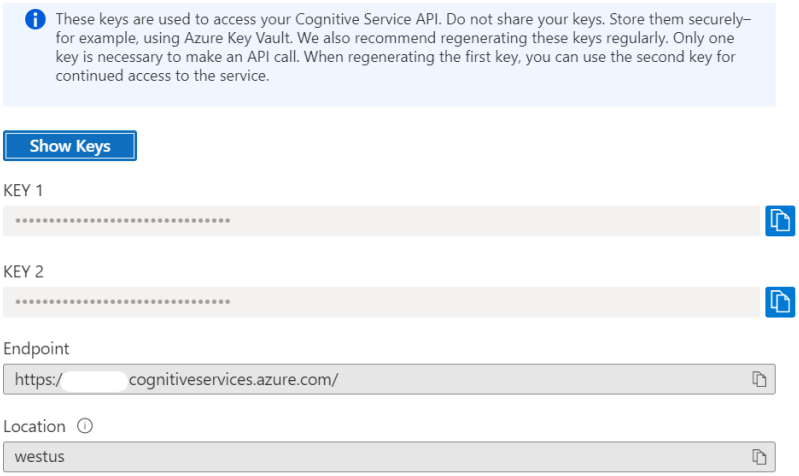


10. (If applicable) Change `speechToTextToSpeech_subscription_ID`, `speechToTextToSpeech_subscription_region`, `qna_authoring_key`, `qna_authoring_endpoint`, and `qna_runtime_endpoint` to your Microsoft Azure Keys. More information in section “Microsoft Azure Keys.”
11. Run MainClient.java (or MainClientMac.java) and follow the consol instructions.

Microsoft Azure Keys (for Organizational Developers)

This program utilizes Microsoft Azure for Speech to Text, Text to Speech, and QnA Bot. This will require you to make your own subscription and substitute your own IDs.

1. Make your own Microsoft Azure Account here.
2. Acquire `speechToTextToSpeech_subscription_ID` and `speechToTextToSpeech_subscription_region`
    a. Follow the instructions provided by Microsoft here
    b. Note:
    The KEY 1 or KEY 2 is `speechToTextToSpeech_subscription_ID`
    The location is the `speechToTextToSpeech_subscription_region`



3. Acquire `qna_authoring_key`, `qna_authoring_endpoint`, `qna_runtime_endpoint`
    a. Follow the instruction provided by Microsoft here
4. Substitute login credentials in lines 35-39

QnA Knowledge Bases

To customize the knowledge base, use the `KnowledgeBaseMaker.java`. Remember to change `qna_authoring_key`, `qna_authoring_endpoint`, `qna_runtime_endpoint` to your Microsoft Azure account's qna keys and endpoints.

Checking for Existing Knowledge Base

1. Run the `KnowledgeBaseMaker.java`
2. In the console, the existing knowledge base is displayed by both name and knowledge base IDs.

Downloading an Existing Knowledge Base

1. Run the `KnowledgeBaseMaker.java`
2. In the console, the existing knowledge base is displayed by both name and knowledge base IDs.
3. Enter "1" in the console.
4. Reference the desired knowledge base's ID. Copy, paste, and enter the ID in the console.
5. Enter the file path of the new file. Must use " / ".
    a. Example
        i. /Users/UWstudent/Desktop/ENTER_FILE_NAME.xlsx

Adding a New Knowledge Base

1. Prepare an Excel of questions and answers that follows the format described
    a. Column A: This will be a column of questions. Cell A1 must be "Questions"
    b. Column B: This will be a column of answers. Cell B1 must be "Answers". Answers must be labeled starting with either "Speaker 1:" (PATIENT) or "Speaker 2:" (NURSE) unless it is a function. Note: case non-sensitive.
    c. Example here:

	A	B
1	Questions	Answers
2	Can you please tell me the months of the year starting from January?	SPEAKER 1: January, February, March, April, May June, July, August, September, October, November, December.
3	Can you spell the word for me?	SPEAKER 2: The patient correctly spelled the word
4	Can you spell the word backwards please?	SPEAKER 2 : The patient correctly spelt the word backwards
5	Can you tell me your name?	.getPatientName()

2. Run the `KnowledgeBaseMaker.java`
3. Enter "3" in the console.
4. Enter the desired name of the knowledge base.
5. Enter the excel file path. Do not include C://
    a. Example: /Users/UWstudent/Desktop/ENTER_FILE_NAME.xlsx

Deleting an Existing Knowledge Base

1. Run the `KnowledgeBaseMaker.java`
2. In the console, the existing knowledge base is displayed by both name and knowledge base IDs.
3. Enter “4” in the console.
4. Reference the desired knowledge base's ID. Copy, paste, and enter the ID in the console.
5. Enter the desired knowledge base ID to delete.
6. Enter an excel file path to save the deleted knowledge base. Do not include `C://`
    a. Example: `/Users/UWstudent/Desktop/ENTER_FILE_NAME.xlsx`

Updating an Existing Knowledge Base (Mac Users)

1. Run the `KnowledgeBaseMaker.java`
2. Enter “2”.
3. Reference the desired knowledge base's ID. Copy, paste, and enter the ID in the console.
4. Enter the file path for an Excel sheet and it will be downloaded there. Do not include `C://` You will go into the sheet to remove or add questions.
    a. Example Format: `/Users/UWstudent/Desktop/ENTER_FILE_NAME.xlsx`
5. Go on the downloaded excel sheet and add/remove/edit questions and answers.

    IMPORTANT: Answers must be labeled starting with either “Speaker 1:” (Patient Voice) or “Speaker 2:” (Nurse Voice) unless it is a function.

    Example Format

	A	B
1	Questions	Answers
2	Can you please tell me the months of the year starting from January?	SPEAKER 1: January, February, March, April, May June, July, August, September, October, November, December.
3	Can you spell the word for me?	SPEAKER 2: The patient correctly spelled the word
4	Can you spell the word backwards please?	SPEAKER 2 : The patient correctly spelt the word backwards
5	Can you tell me your name?	.getPatientName()

6. Save excel sheet.
7. Enter “1” when done.
8. If errors for Excel saving arise, refer to the last section.

Updating an Existing Knowledge Base (Windows Users)

1. Run the `KnowledgeBaseMakerWindows.java`
2. Enter “1”.
3. Reference the desired knowledge base's ID. Copy, paste, and enter the ID in the console.
4. Enter the file path for an Excel sheet. Do not include C:// You will go into the sheet to remove or add questions.
    a. Example Format: /Users/UWstudent/Desktop/ENTER_FILE_NAME.xlsx
5. Stop the program.
6. Go to the Excel sheet and add/remove/edit questions and answers.

    IMPORTANT: Answers must be labeled starting with either “Speaker 1:” (Patient Voice) or “Speaker 2:” (Nurse Voice) unless it is a function.

    Example Format

	A	B
1	Questions	Answers
2	Can you please tell me the months of the year starting from January?	SPEAKER 1: January, February, March, April, May June, July, August, September, October, November, December.
3	Can you spell the word for me?	SPEAKER 2: The patient correctly spelled the word
4	Can you spell the word backwards please?	SPEAKER 2 : The patient correctly spelt the word backwards
5	Can you tell me your name?	.getPatientName()

7. Save excel sheet.
8. Run the `KnowledgeBaseMakerWindows.java` again
9. Enter “2”.
10. Reference the desired knowledge base's ID again. Copy, paste, and enter the ID in the console.
11. Enter “0” to skip saving the KB and start updating.
12. Enter the file path for the Excel sheet that you edited in step 4.
13. If errors arise, refer to the last section (Updating a Knowledge Base and Changing the Knowledge Base ID)

Updating a Knowledge Base and Changing the Knowledge Base ID (Mac + Windows)

1. Run the `KnowledgeBaseMaker.java`
2. Enter “4” in the console.
3. Delete the desired knowledge base and it will save the knowledge base questions and answers you deleted into an Excel file.
4. Open the excel of the desired knowledge base.
    a. The output excel will have questions and answers that follows the format described here
        i. Column A: This will be a column of questions.
        ii. Column B: This will be a column of answers.
    b. If removing a question, find the question to remove.
    c. If adding a question, add question and answer with following format

        IMPORTANT: Answers must be labeled starting with either “Speaker 1:” (Patient Voice) or “Speaker 2:” (Nurse Voice) unless it is a function.

        Example Format

	A	B
1	Questions	Answers
2	Can you please tell me the months of the year starting from January?	SPEAKER 1: January, February, March, April, May June, July, August, September, October, November, December.
3	Can you spell the word for me?	SPEAKER 2: The patient correctly spelled the word
4	Can you spell the word backwards please?	SPEAKER 2 : The patient correctly spelt the word backwards
5	Can you tell me your name?	.getPatientName()

    d. Save excel file.
5. Return to the main screen.
6. Follow instructions to add a new knowledge base.
7. Enter the file path of the updated excel sheet from earlier. Do not include C://
    a. Example Format: /Users/UWstudent/Desktop/ENTER_FILE_NAME.xlsx

Program Fundamentals

Some key parts of the NLP program are developers being able to add new scenarios, customize speech characteristics, and add new functions for questions that do not have one static answer such as asking a patient to do some mental math.

How to Add a New Scenario

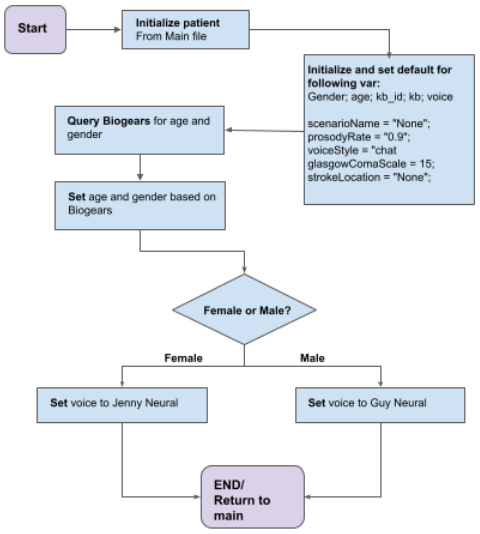
1. Add a knowledge base for the new scenario. Make sure the knowledge base name matches the scenario name.
2. Go to `Patient.java`.
3. Declare any new private variable that can affect speech characteristics or knowledge base for your scenario.
    a. Set the new private variables as values for a normal healthy patient.
4. Make a private method as shown in line 160-164 to update the Patient's knowledge base and any other speech characteristic (ie. prosodyRate)
    a.
    b.

```
157
158     // Skeleton of an update function for another scenario with require variables
159     /*
160         private void XXXScenerioInfo(String queryBiogearScenario) {
161             this.scenarioName = queryBiogearScenario;
162             this.kb_id = kb.get(this.scenarioName);
163             // ANY OTHER RELEVANT INFO
164         }
165     */
```

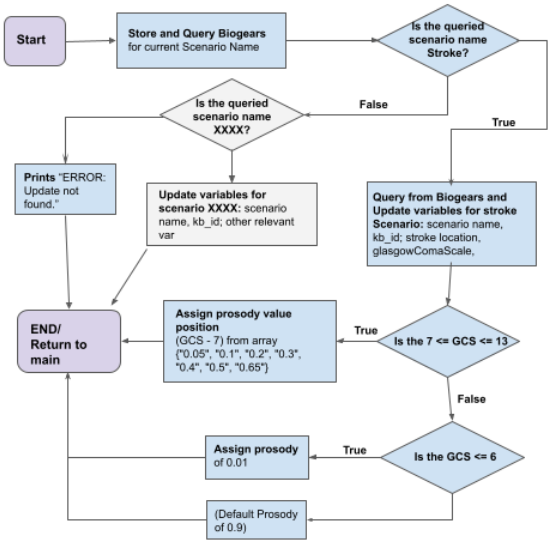
5. In the updatePatient method, add your new private method in the if/else branch with a `else if` check of `queryBiogearsScenario.equals(YOUR_SCENARIO NAME)`

Resources:
For further understanding of Patient.java, please refer to the block diagram below.

Patient Constructor Initialization (1st time)



Patient Update Function



How to Customize Speech Characteristics

To customize the speech, go to `Patient.java`

- Change voice style
  - Var name `voiceStyle` (line 40)
  - List of styles here
- Changing speed of voice
  - Var name `prosodyRate` (line 39)
  - Change from any integer from 0 to 1.
- Change voice type of Male or Female voice?
  - Go to Patient constructor at line 36-61
  - List of voices here
- Other customization:
  - https://docs.microsoft.com/en-us/azure/cognitive-services/speech-service/speech-synthesis-markup?tabs=csharp
  - Refer to `MainClient.java` at lines 189-198 for further customization

How to Add a Function for Parameter-dependent Answers

1. Make your function file a new class with a method that takes in a String question, and any other relevant variables, and returns a String. Let's call it class XYZ.java with a method `public static String abc(String question, int var1, int var2)`
2. Go to `PostKBFunction.java`
   a. In the `postKBFunctionCaller` method, add your `else if` statement. Ensure the returned String has "Speaker 1: "(Patient Voice) or "Speaker 2: "(Nurse Voice)

```
i.   else if (qAnswer.equals(".getXYZ()") {
          return "Speaker 1: " + XYZ.abc(question, var1, var2);
     }
```

3. Update to all knowledge bases with the following information into excel
   i. Question: "Your question?"
   ii. Answers: ".getXYZ()"
   iii. Example

What year is it right now?	.getYear()
What month is it?	.getMonth()
Can you tell me the month?	.getMonth()
What day is it right now?	.getDate()
Can you tell me the day?	.getDate()
What is the date?	.getDate()
What day of the week is it?	.getDayOfWeek()