2020

2021

A close up of a logo

Description automatically generated

Project: CATO

Company: DNASC (Definitely Not A Software Company)

Release #: 1.0

Version #: 1.0

Date: Nov 06, 2020

Professor: Calvin Caldwell

Analyst: Jihyuk Chung

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SIGNATORY PAGE

|  |  |
| --- | --- |
| X\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_ |
| Author: Jihyuk Chung | Date |
|  |  |
| X\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_ |
| Reviewer: Calvin Caldwell | Date |

REVISION HISTORY

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Authors** | **Company** | **Version** | **Date** | **File Name** | **Comments** |
| Jihyuk Chung | DNASC | 1.0 | Nov 06, 2020 | [CST412] Object Model by Jihyuk Chung.docx | Final Draft |
|  |  |  |  |  |  |

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1. EXECUTIVE CLASS DIAGRAM

Diagram

Description automatically generated

1. DETAILED CLASS DIAGRAM

Diagram

Description automatically generated

1. CLASS SPECIFICATION – COURSE

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Course | |
| **Abstract Type:** No | **Persistence:** No |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 100 | UC 100 Chatbot | 1 |
| 200 | UC 200 Course Materials | 1 |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| addStudent(String id) | Is a professor or admin | Add a student |
| addProfessor(String id) | // | Add a professor |
| removeStudent(String id) | // | Remove a student |
| removeProfessor(String id) | // | Remove a professor |
|  |  |  |
| askQuestion(String userID) | N/A | Ask a question to the Chatbot |
| connectDB() | N/A | Connect to DB |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| students | List<student> | Y | Instance | private | List of students in the class |
| professors | List<professor> | Y | Instance | private | List of professors in the class |
| materials | List<material> | Y | Instance | private | List of materials in the class |

|  |  |
| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

|  |  |  |
| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Chatbot API error | Connection Lost to the API | Send an error message and report it to the system |
| Incorrect DB request | Wrong user permission or id | Send an error message and report it to the system |
|  |  |  |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
|  |  |  | 1 |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. CLASS SPECIFICATION – STUDENT

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Student | |
| **Abstract Type:** No | **Persistence:** Yes |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 100 | UC 100 Chatbot | 1, 2, 3, 7, 8, 9, 10 |
| 200 | UC 200 Course Materials | 1, 2, 6 |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| ID | String | Y | Instance | private | Student ID |
| major | List<String> | Y | Instance | private | List of majors |

|  |  |
| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

|  |  |  |
| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Update error | Failed to update information | Send an error message |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
|  | 0..\* |  |  |
|  |  |  |  |

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| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. CLASS SPECIFICATION – PROFESSOR

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Professor | |
| **Abstract Type:** No | **Persistence:** Yes |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 100 | UC 100 Chatbot | 1, 2, 3, 7, 8, 9, 10 |
| 200 | UC 200 Course Materials | 1, 2, 3, 4, 6 |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| getMaterial() : String | N/A | Get material instance |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| depart | String | Y | Instance | private | Department |
| location | String | Y | Instance | private | Campus location |
| building | String | Y | Instance | private | Campus building |
| room | String | Y | Instance | private | Room number |

|  |  |
| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

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| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Update error | Failed to update information | Send an error message |
|  |  |  |

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| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
|  | 0..\* |  |  |
|  |  |  |  |

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| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. CLASS SPECIFICATION – PERSON

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Person | |
| **Abstract Type:** No | **Persistence:** Yes |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 100 | UC 100 Chatbot | 1, 2, 3, 7, 8, 9, 10 |
| 200 | UC 200 Course Materials | 1, 2, 3, 4, 6 |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| requestChatDeletion() |  | Request to delete chat history from the DB |
| requestChatDeletionAll() |  | Request to delete all chat history from the DB |

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| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| Id | String | Y | Instance | private | The user ID |
| email | String | Y | Instance | private | The user email (OIT) |
| ~~password~~ | ~~String~~ | ~~Y~~ | ~~Instance~~ | ~~private~~ | ~~The user password (encrypted)~~ |
| fullName | String | Y | Instance | private | The name of a person |
| phone | String | Y | Instance | private | The phone number of a person |
| lastLogIn | DateTime | Y | Instance | private | Last log in date |
| ~~chatHistory~~ | ~~List<String>~~ | ~~Y~~ | ~~Instance~~ | ~~private~~ | ~~Document IDs of user chat history~~ |
|  |  |  |  |  |  |

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| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

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| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Update error | Failed to update information | Send an error message |
|  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
|  | 0..\* |  |  |
|  |  |  |  |

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| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. CLASS SPECIFICATION – COURSE MATERIAL

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Course Material | |
| **Abstract Type:** No | **Persistence:** Yes |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 200 | UC 200 Course Materials | 1 - 6 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| upload(String path) | File path chosen  Is a professor or admin | Upload a course material to DB |
| download(String id) | A file exists | Download a course material from DB |
| delete(String id) | A file exists.  Is a professor or admin | Delete a course material from DB |

|  |  |  |
| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| ID | String | Y | Instance | private | Material ID |
|  |  |  |  |  |  |

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| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

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| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Connection error | Failed to connect to DB | Send an error message |
| Upload error | Failed to upload a file | Send an error message |
| Download error | Failed to download a file | Send an error message |
| Delete error | Failed to delete a file | Send an error message and report to the system |

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| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
|  | 5GB |  |  |
|  |  |  |  |

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| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. CLASS SPECIFICATION – CHATBOT

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Chatbot | |
| **Abstract Type:** No | **Persistence:** No |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 100 | UC 100 Chatbot | 1 - 10 |
| 200 | UC 200 Course Materials | 5 |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| requestQuestion(String text) | User asks a question | Interpret the question using NLTK, a natural language toolkit |
| findAnswerTrained() | Questions given | Find an answer to the question from intents.JSON using trained model |
| findAnswerBERT() | Questions given | Find an answer to the question from the course materials using pre-trained BERT model |
| requestUserRating() | Questions given | Asks for a user rating on the answer and send to the professor if not satisfied. |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

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| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| server | Server | Y | Instance | private | A server object of the app for listening ports, etc. |
|  |  |  |  |  |  |

|  |  |
| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

|  |  |  |
| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Connection error | Failed to connect to DB | Send an error message |
| Upload error | Failed to upload a file | Send an error message |
| Download error | Failed to download a file | Send an error message |
| Delete error | Failed to delete a file | Send an error message and report to the system |

|  |  |  |  |
| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
|  |  |  | 1 |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. CLASS SPECIFICATION – CHATBOT MODELS

|  |  |
| --- | --- |
| **Class Information** | |
| **Class Name:** Chatbot Models | |
| **Abstract Type:** No | **Persistence:** No |

|  |  |  |
| --- | --- | --- |
| **Trace-ability Information** | | |
| **Use Case ID** | **Use Case Name** | **Steps** |
| 100 | UC 100 Chatbot | 1 - 10 |
| 200 | UC 200 Course Materials | 5 |

|  |  |  |
| --- | --- | --- |
| **Public Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| updateModel(String path) | Previously trained model exists | Update the model with a re-trained model |
|  |  |  |

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| --- | --- | --- |
| **Protected Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| **Private Methods** | | |
| **Signature** | **Preconditions** | **Post Conditions** |
| N/A | N/A | N/A |
|  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attributes** | | | | | |
| **Name** | **Type** | **Object (Y/N)** | **Instance / Static** | **Visibility** | **Description** |
| ID | String | Y | Instance | private | Chatbot model ID |
| path | String | Y | Instance | private | Chatbot model path in the system or server |

|  |  |
| --- | --- |
| **Concurrency** | |
| **Threading Issue** | **Description** |
| N/A | N/A |
|  |  |

|  |  |  |
| --- | --- | --- |
| **Major Exceptions** | | |
| **Name** | **Trigger** | **Action** |
| Incorrect model | Corrupted model detected | Send an error message  Request a new model |
| Model not found | A model not found from the system | Send an error message  Request a new model |

|  |  |  |  |
| --- | --- | --- | --- |
| **Instance Information** | | | |
| **Minimum** | **Maximum** | **Mean** | **Fixed** |
| 1 | 2 |  |  |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| **General Comments** | | |
| **Author** | **Date** | **Comments** |
| N/A | N/A | N/A |
|  |  |  |

1. APPENDIX A – GLOSSARY OF TERMS

N/A

1. APPENDIX B – CRUD MATRIX

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Use Case ID** | **Use Case Name** | **Person** | **Tx** | **C3** | **C4** | **C6** | **C7** |
| 100 | Chatbot | CRUD | X |  |  |  |  |
| 200 | Course Materials | CRUD |  | X |  |  |  |
|  |  |  |  |  |  |  |  |

1. APPENDIX C – CHANGE REQUEST FORM

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date Requested: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Description of Proposed Change:

Reason for change:

Comments: