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| **HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY**  **\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***  A picture containing icon  Description automatically generated  **OOP LAB**  **REPORT MINI-PROJECT**  **Team 06**  *Demonstration of types of COVID-19 virus and its mechanism* |
| ***Team Member:***   1. Bui Tran Hai Quan – 20194821 2. Nguyen Minh Quan – 20194823 3. Tran Quang Thai – 20194836   ***Lecturer:*** Nguyen Thi Thu Trang  **Hanoi, July 2022** |

# Assignment of members

# Bui Tran Hai Quan

# Search information of Virus about: structure, infecting stages, symptoms, infecting method

# Main Screen and Help Screen

# Nguyen Minh Quan

# Design about Structure of Virus, Related Screen and Controller

# Contribute to Designing Virus Package

# Design base of Element Package

# Tran Quang Thai

# Design about Infection of Virus, Related Screen and Controller

# Contribute to Designing Virus Package

# Refactor, Add Composition and Aggregation in Element Package

# Mini-project Description

# *Mini-project requirement*

# Project Name: Demonstration of types of COVID-19 virus and its mechanism

# The main purpose of this project is to illustrate the detail structure and the infecting stages of some common viruses. As we all know, COVID-19 pandemic has been affected deeply to our lives all over the world fallen-down economy, millions of people has died, … Thus, there is a necessary requirement of understanding the different types of the virus, as well as the way they infect to have the basic knowledge to prevent them. Every virus has 2 basic elements: acid nucleic and capsid. Based on their structure, viruses are divided into 2 categories: Enveloped Virus and Non-Enveloped Virus. Our application, which contains 6 viruses (HIV, COVID-19, Herpes, Rota, Astro and Adeno virus), will concentrate on what the viruses are constructed from and how they attack host-cells.

# *Use-case diagram and explanation*

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# Firstly, users could have ability to access the application. In the main menu screen, they can click at “Help” button to get the support of introducing about this project and instructions for use. Users can also pick up the type of virus: “Virus with envelope” or “Virus without envelope”. “Virus with envelope” contains HIV, COVID-19, Herpes. Meanwhile, “Virus without envelope” includes Rota, Astro and Adeno virus. Users can observe the structure of each virus if they choose one type of above viruses. After that, they can view the infecting stages step by step. Moreover, this application has a “go back” area, which makes returning to main menu convenient.

# Design

# *General class diagram*

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# We can see from the general class diagram that this project is followed by the MVC model. Package Controller helps executing the package Screen and the application be smoother.

# In the package Virus, class VirusEnvelope and class VirusNonEnvelope extend class Virus, because every virus in our knowledge could be divided into these 2 types, they inherit all common characteristics of general viruses.

# Virus class has aggregation relationship with Capsid class and Acid Nucleic because all viruses must have these 2 elements but when the virus attack host-cell, virus took away capsid and re-construct the Acid Nucleic, which means they are Has-a relation and independent.

# VirusEnvelope has composition relationship with Envelope class because envelope is compulsory for us to discriminate between Envelope Virus and Non-Envelope Virus. Envelope virus can’t live without their “shell”.

# *Packages and detail class diagrams*

# *Virus class*

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# *Element package*

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# Element is a class to describe every biological part of a virus. Thus, AcidNucleic, Capsid, Envelope and DispensableElement classes extend from Element class

# *VirusEnvelope package*

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# HIV, COVID-19, Herpes are Enveloped virus, so they must extend VirusWithEnvelope.

# *VirusNonEnvelope package*

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# Astro, Rota and Adeno are all Non-enveloped virus. They extend from VirusWithoutEnvelope.

# *Screen package*

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# *Controller package*

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# *OOP Design*

# Inheritance: Enveloped Virus, Non-enveloped virus inherits Virus class; HIV, COVID-19, Herpes inherit Enveloped Virus; Rota, Astro, Adeno inherit Non-Enveloped Virus …

# Encapsulation: method getters, setters in each virus class: getTegument(); getMProtein(); getFiber();…

# Abstraction: abstracted class Element: describe biological components of a virus

# Polymorphism: getDetail() method; infect() method; downcasting from Virus class to VirusWithEnvelope