



**ĐẠI HỌC
BÁCH KHOA HÀ NỘI**
HANOI UNIVERSITY
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OBJECT - ORIENTED PROGRAMMING PROJECT REPORT

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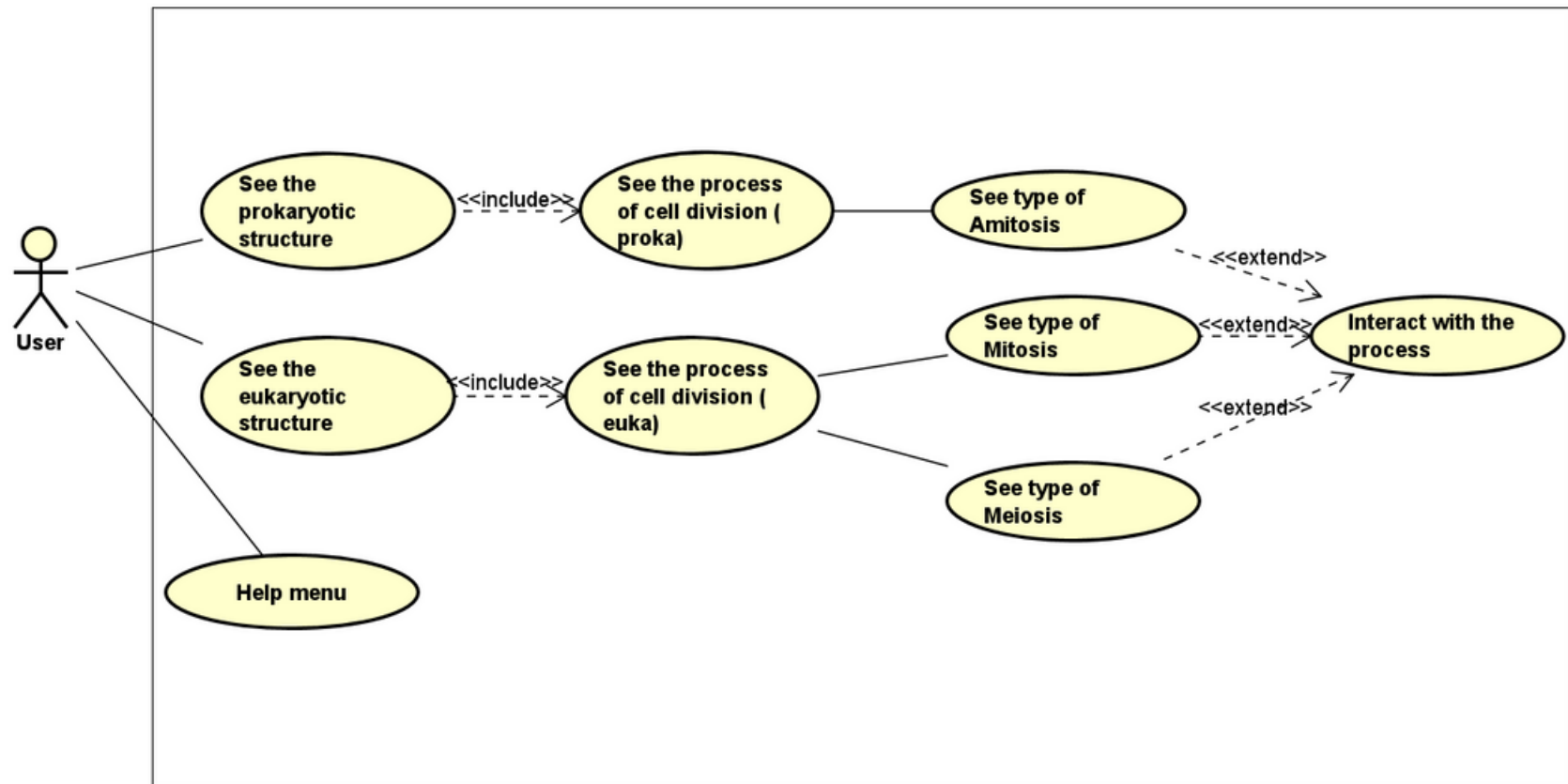
ONE LOVE. ONE FUTURE.

1.TOPIC: DEMONSTRATION OF TYPES OF CELL DIVISION

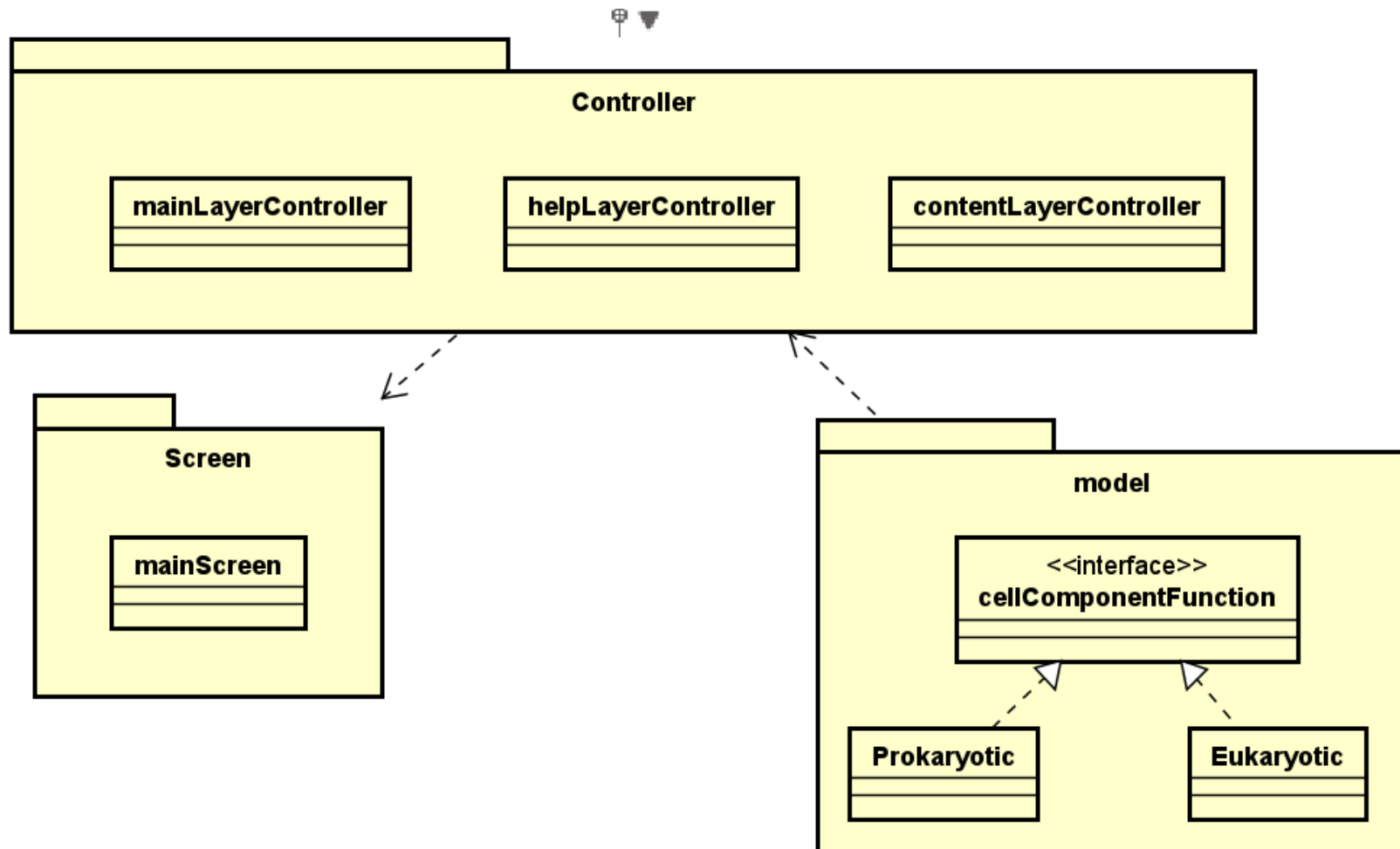
-Basic knowledge: Cell cycle, Direct cell division or amitosis, Mitosis, and Meiosis

-Language: Java

2.USE CASE DIAGRAM:



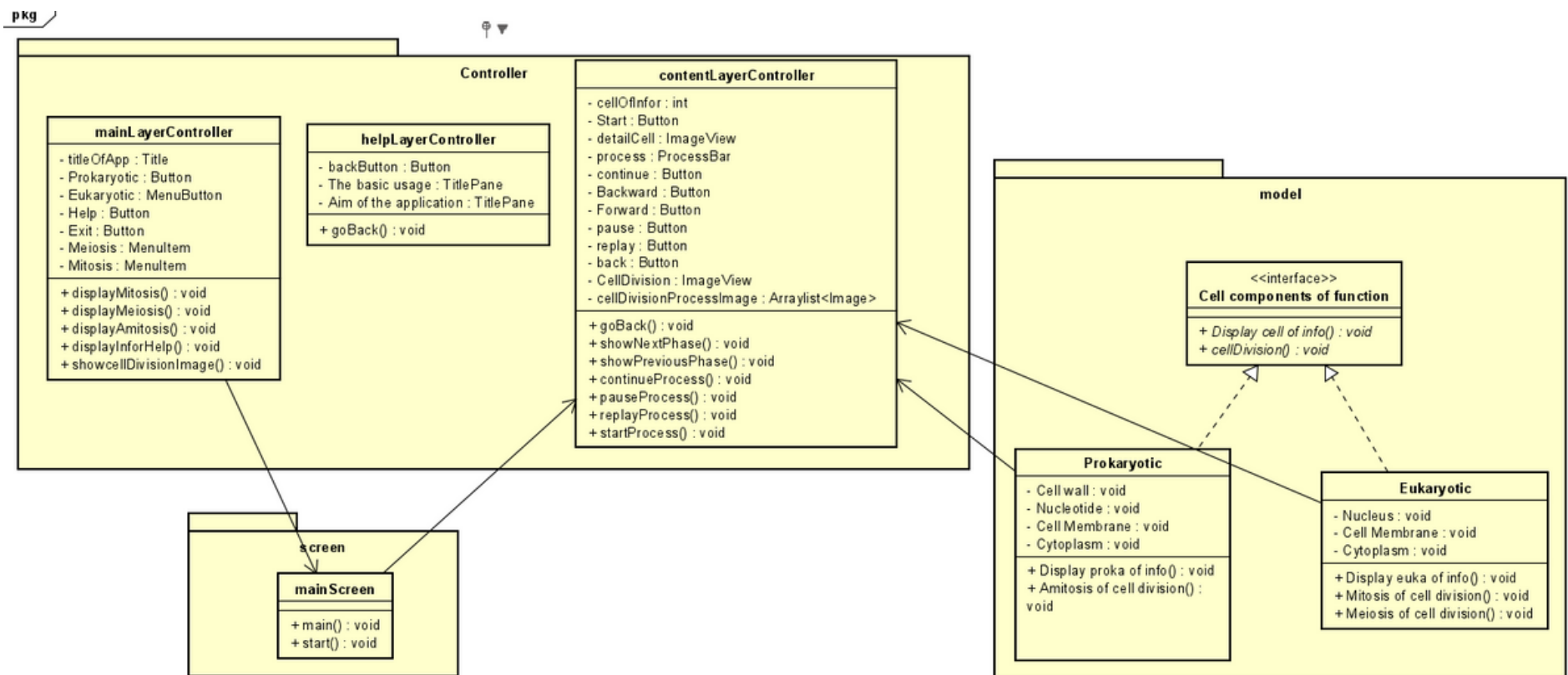
3. GENERAL CLASS DIAGRAM:



4.CLASS DIAGRAMS FOR PACKAGES:

- Two main parts of program: **Saving** and **Exporting** images
- Four main packages: **Controller**, **Image**, **Model** and **Screen**

4.CLASS DIAGRAMS FOR PACKAGES:



5.OOP TECHNIQUES:

5.1.Encapsulation

- Encapsulation is used to hide the internal data of an object.
- Applying encapsulation, private data is only used in **contentLayerController()** function.

```
24  ✓ public class contentLayerController {  
25      |  
26      Timer timer = new Timer();  
27      private boolean started = false;  
28      @FXML  
29      private Button BackButton;  
30  
31      @FXML  
32      private ImageView detailCell;  
33  
34      @FXML  
35      private ImageView CellDivision;  
36  
37      @FXML  
38      private Button nextbutton;  
39  
40      @FXML  
41      private Button previousButton;  
42  
43      @FXML  
44      private VBox vbox;
```

5.OOP TECHNIQUES:

5.2.Inheritance

- Inheritance is defined as the process in which a class (class) has get the properties of another class.
- The inherited class will be called the parent class and the derived class will be called.

```
13  ✓ public class main extends Application {  
14      @Override  
15  ✓ public void start(Stage stage) throws Exception {  
16  
17      try {  
18          Parent root = FXMLLoader.load(getClass().getResource("main.fxml"));  
19          Scene scene = new Scene(root);  
20          stage.setTitle("Cell Division");  
21          stage.setScene(scene);  
22          stage.show();
```


5.OOP TECHNIQUES:

5.3.Abstraction

- Abstraction help to hide the actual implementation of an application from users. Therefore, we can reduce the complexity and increase the efficiency of the software.

```
1    package model;  
2  
3    ✓ public interface cellOfFuntion {  
4        void DisplayCellofInfor();  
5  
6        void cellDivision();  
7    }
```

6.DEMO SCENARIO:

- Program displays the cell components.
- Program has “Help” button for the users to read guideline.
- The users can choose which type of cell they want to demonstrate.
- The users press “Start” button to begin the progress of cell division through separate phases.
- On bottom bar, the users can choose to Pause, Continue, or Go backward or forward a step in the execution.
- Program also has “Replay” button.
- Program has a “Back” button for the users to return to the main menu at any time.

Video demo: <https://youtu.be/XUkywcprLps?si=jK1qE7qb1-yXwEqu>