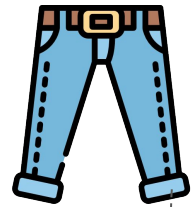
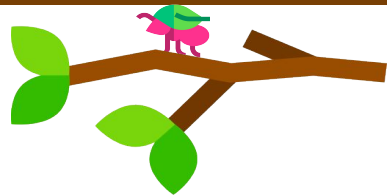




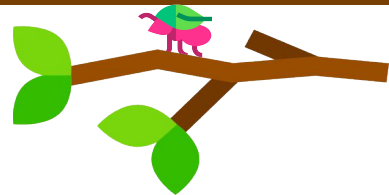
Ants in Your Pants



Data labelling tool to detect and track ant behaviours

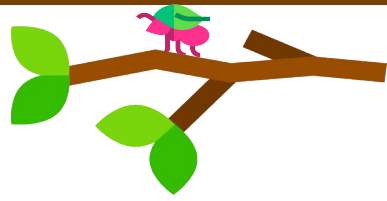


Problem Statement



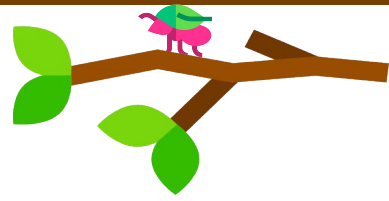
- Automation of **behavioural analyses on ants**
- **Achieved by implementing modern machine learning and computer vision tools**
- However, large **labelled training datasets** are important to create an accurate model
- Currently, there is no user friendly method to collect and label data

Solution:

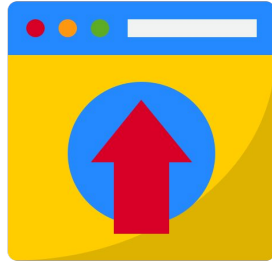


To develop a **software** that enables members of the general community to label datasets that will be used for training the machine learning models

User Requirements



User-friendly
UI



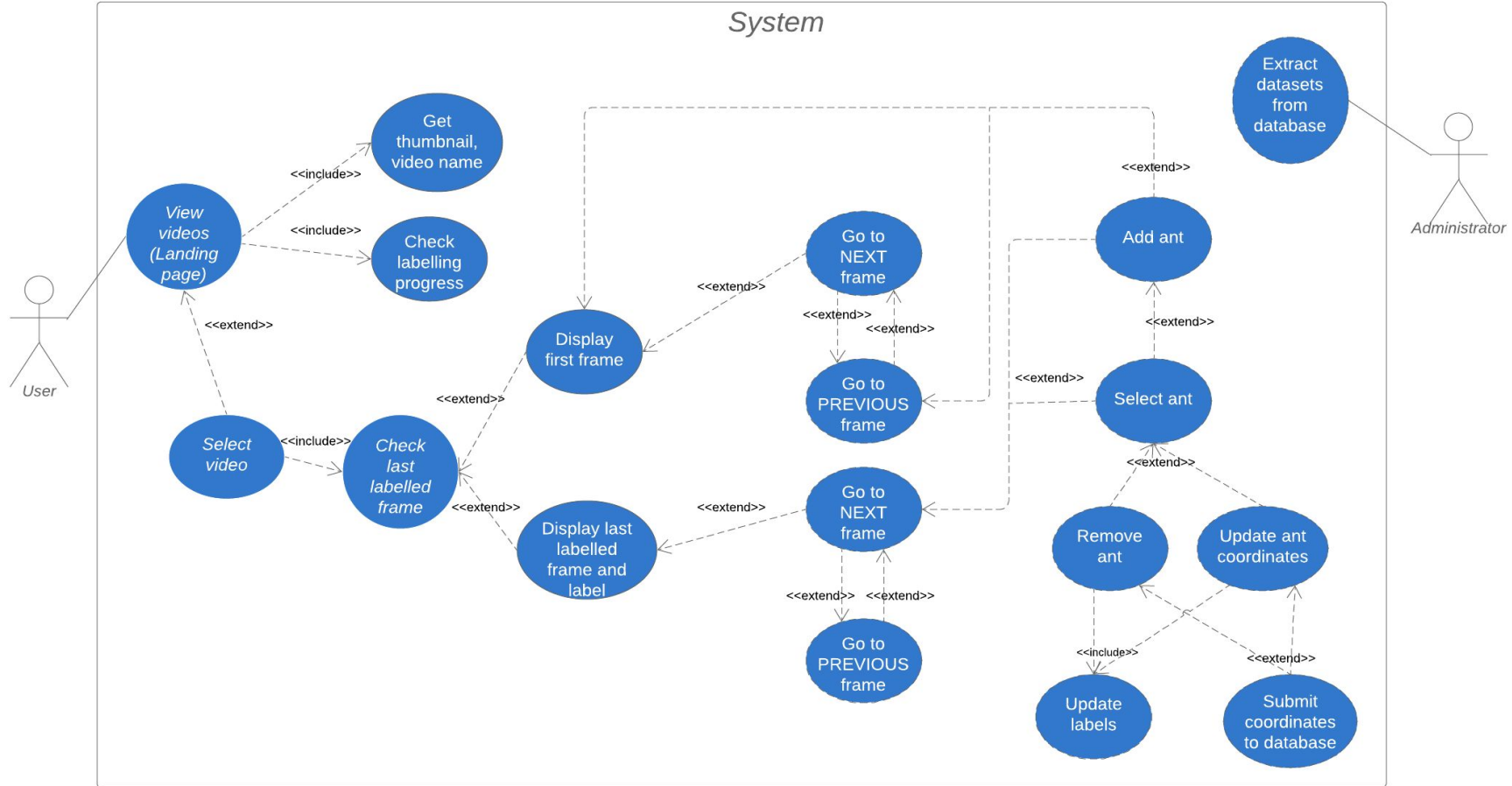
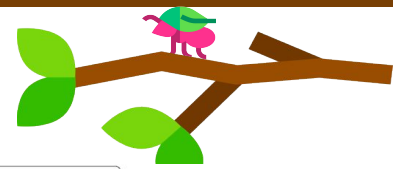
Upload



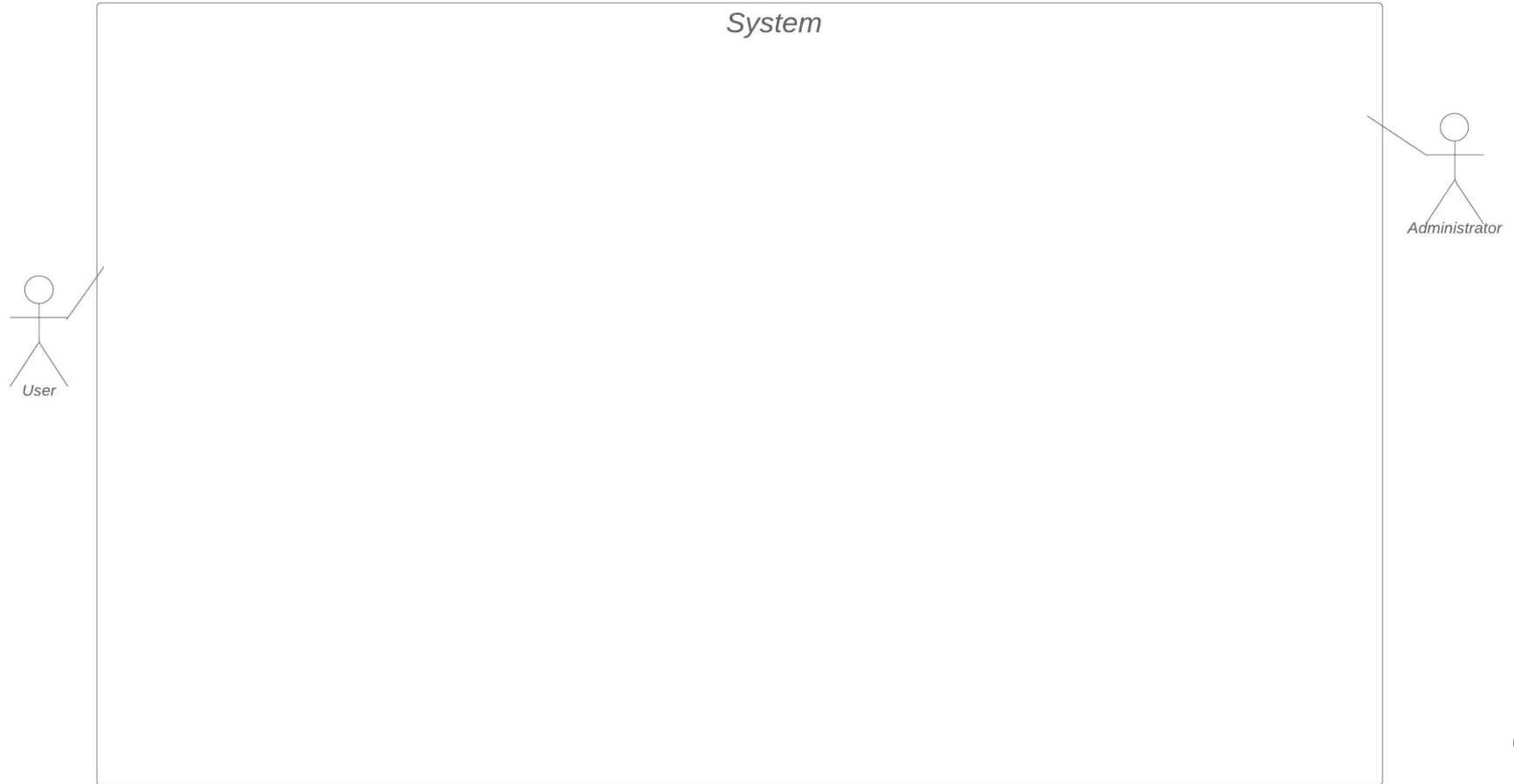
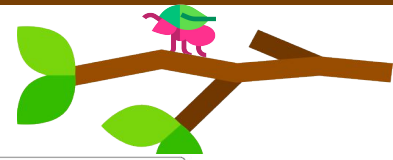
Cloud
Database



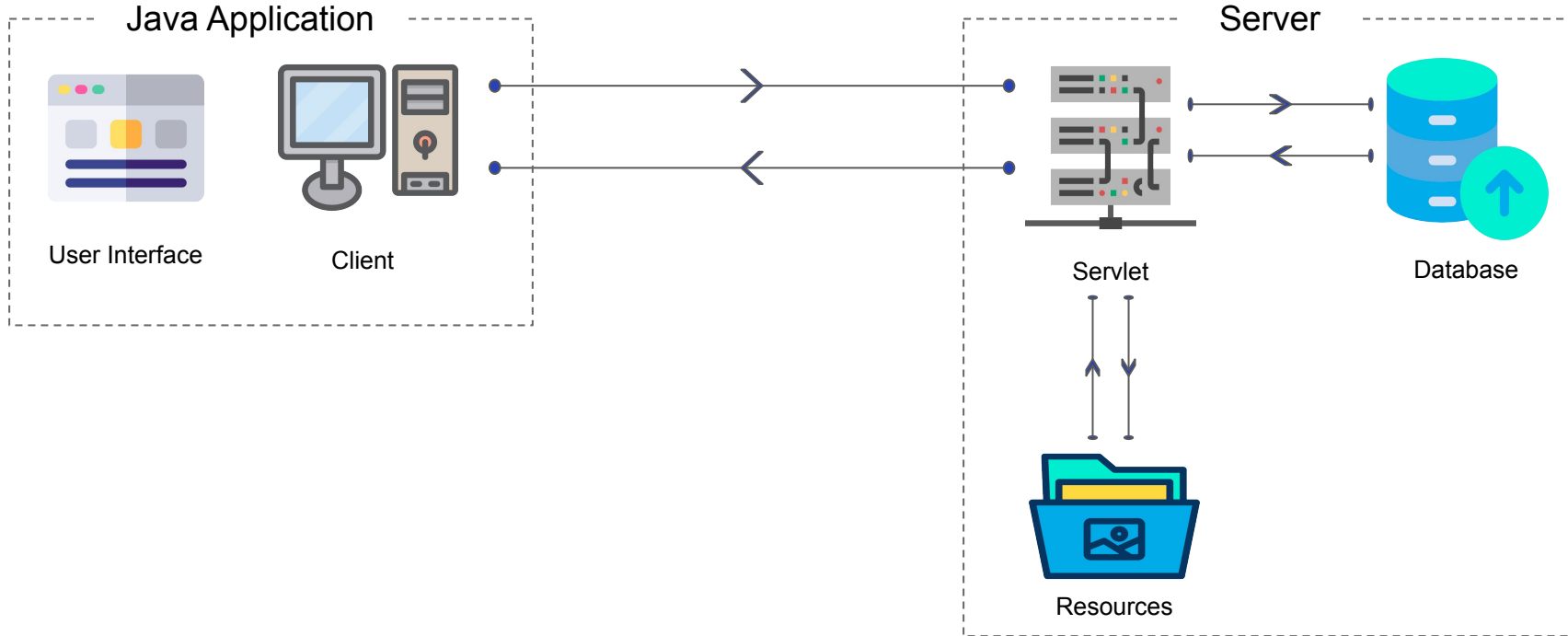
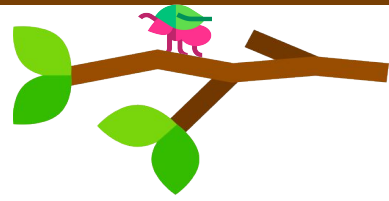
Export as
CSV



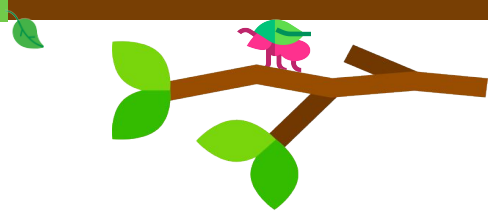
User Requirements: Use Case Diagram



System and Software Design



Java Application: Wireframe




Start page

1

Welcome to Ant GUI





Enter your name




2

Landing Page


Choose a video



| | |
|--|---|
| <div>67%</div>  | <div>100%</div>  |
| <div>20%</div>  | <div>39%</div>  |



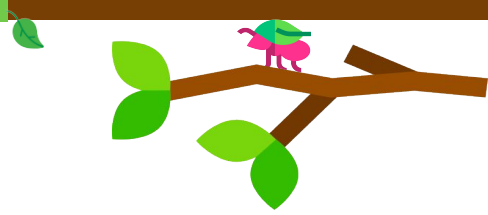
3

Tracking Page

| | | | |
|---|--|---|---|
| <input data-bbox="948 288 1070 355" type="button" value="+"/> | <input data-bbox="1078 288 1199 355" type="button" value="-"/> |  | |
| Ant 1 | Ant 2 | | |
| Ant 3 | Ant 4 | | |
| Ant 5 | | | |
| | | | |
| <input data-bbox="1209 740 1396 816" type="button" value="Prev"/> | | <input data-bbox="1404 740 1591 816" type="button" value="Next"/> | <input data-bbox="1599 740 1740 816" type="button" value="Submit"/> |



Java Application: UI Design



JB

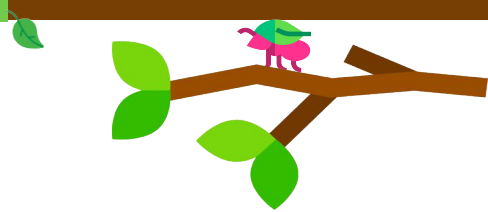
— □ ×

Welcome to Ants GUI
Enter your name

Start

Username is currently logged locally at each program execution but not on the database.

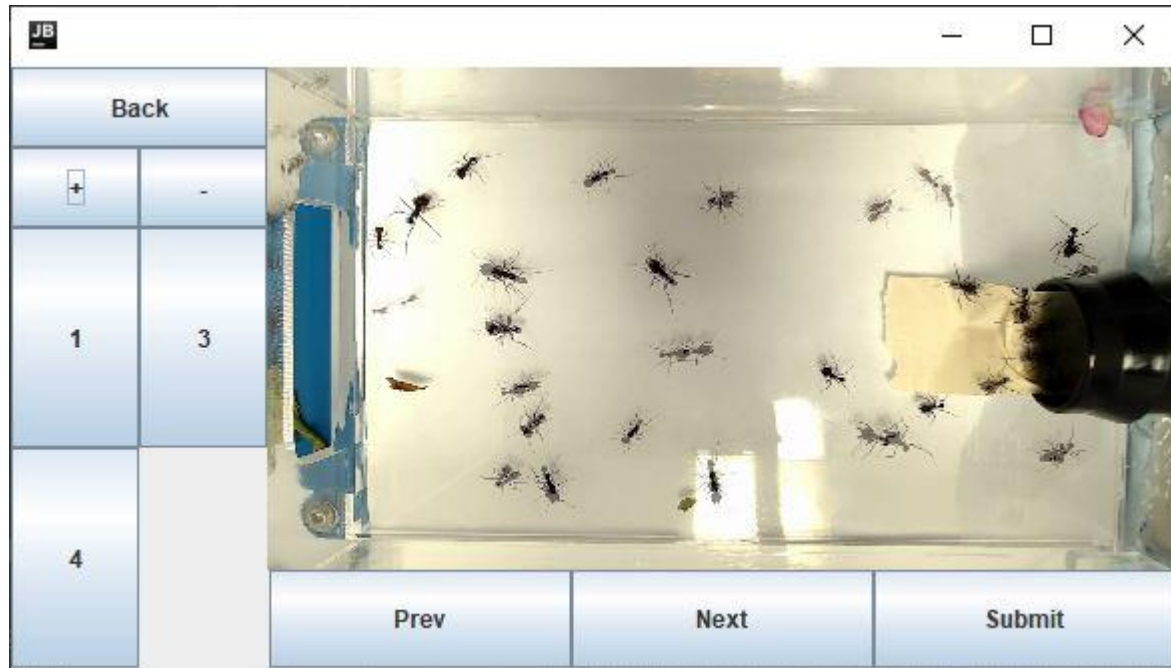
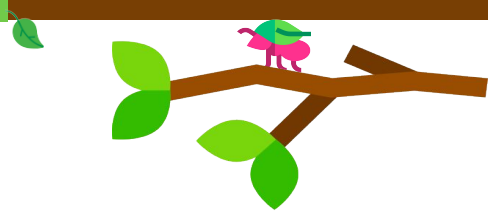
Java Application: UI Design

A screenshot of a Java application window. The window has a title bar with the text 'JB' and standard window controls (minimize, maximize, close). The main content area is divided into several sections. At the top, there is a light gray header bar with the text 'Choose a Video'. Below this, there is a 2x2 grid of blue rectangular buttons. The buttons are labeled 'video 1', 'video 2', 'video 3', and 'video 4'. At the bottom of the window, there is a light blue bar with the text 'Start Video Labelling'.

Video ID will be logged

Currently adding thumbnails
(passed on from servlet) to the
buttons.

Java Application: UI Design



Ant ID for this frame
(frame ID) are logged

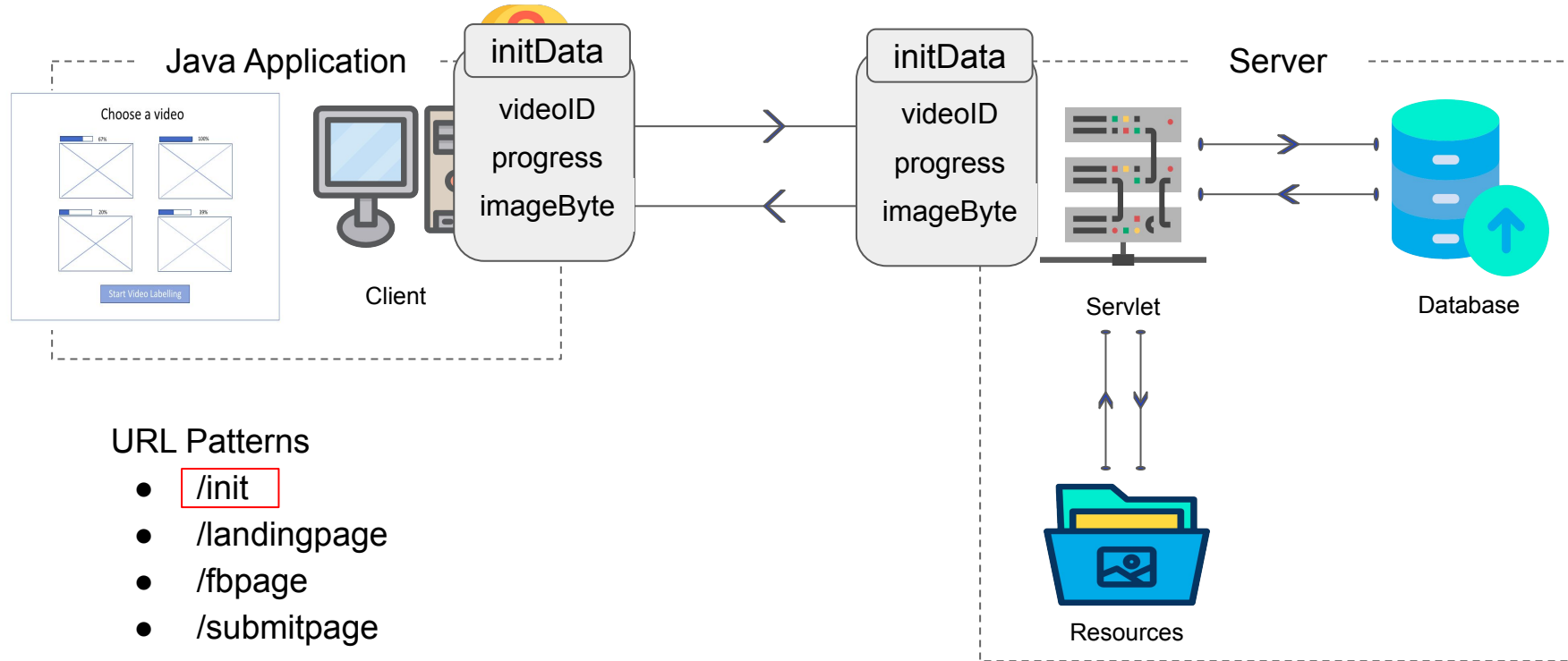
Coordinates are logged
for this ant

Previous frame will
overlay on the current
frame with lower opacity

Ant ID are not reusable

If user clicks multiple times
for coordinate, only the
last entry is saved.

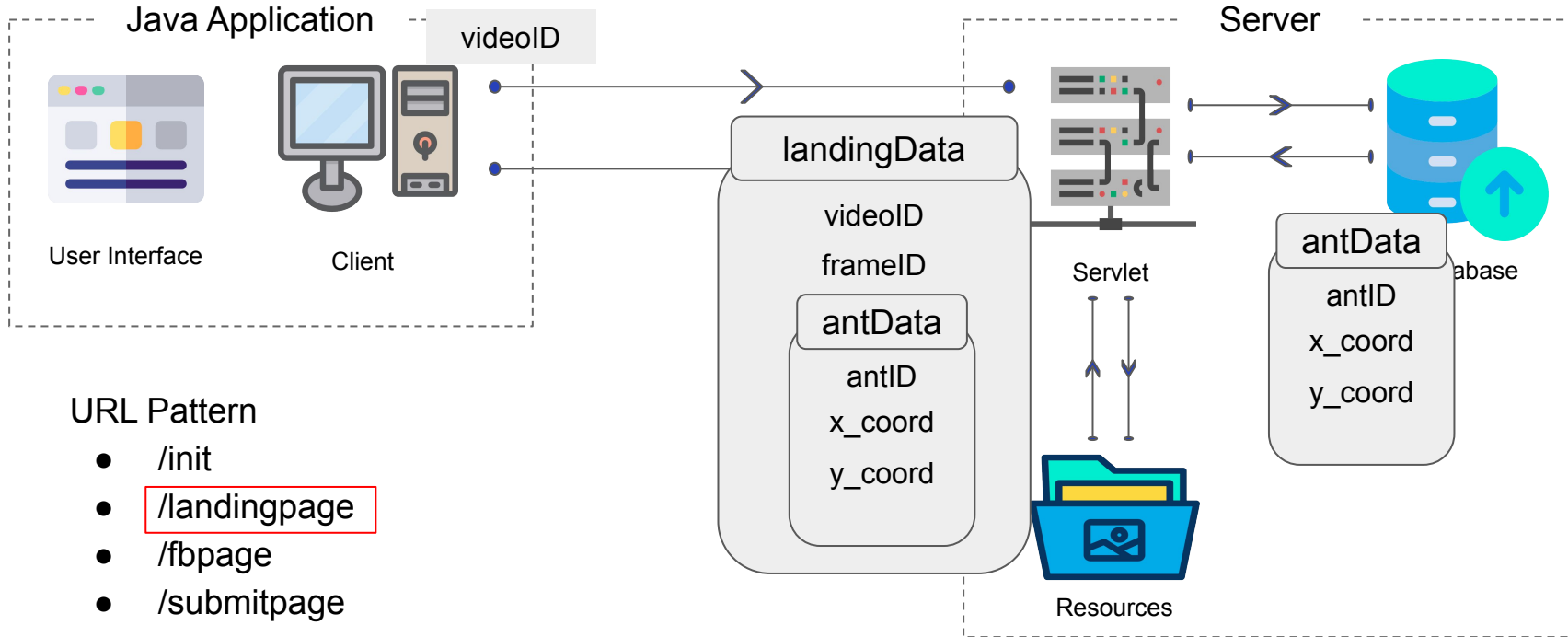
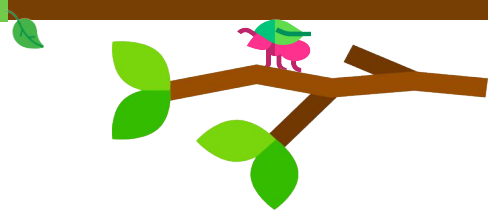
Client-Server Connection:



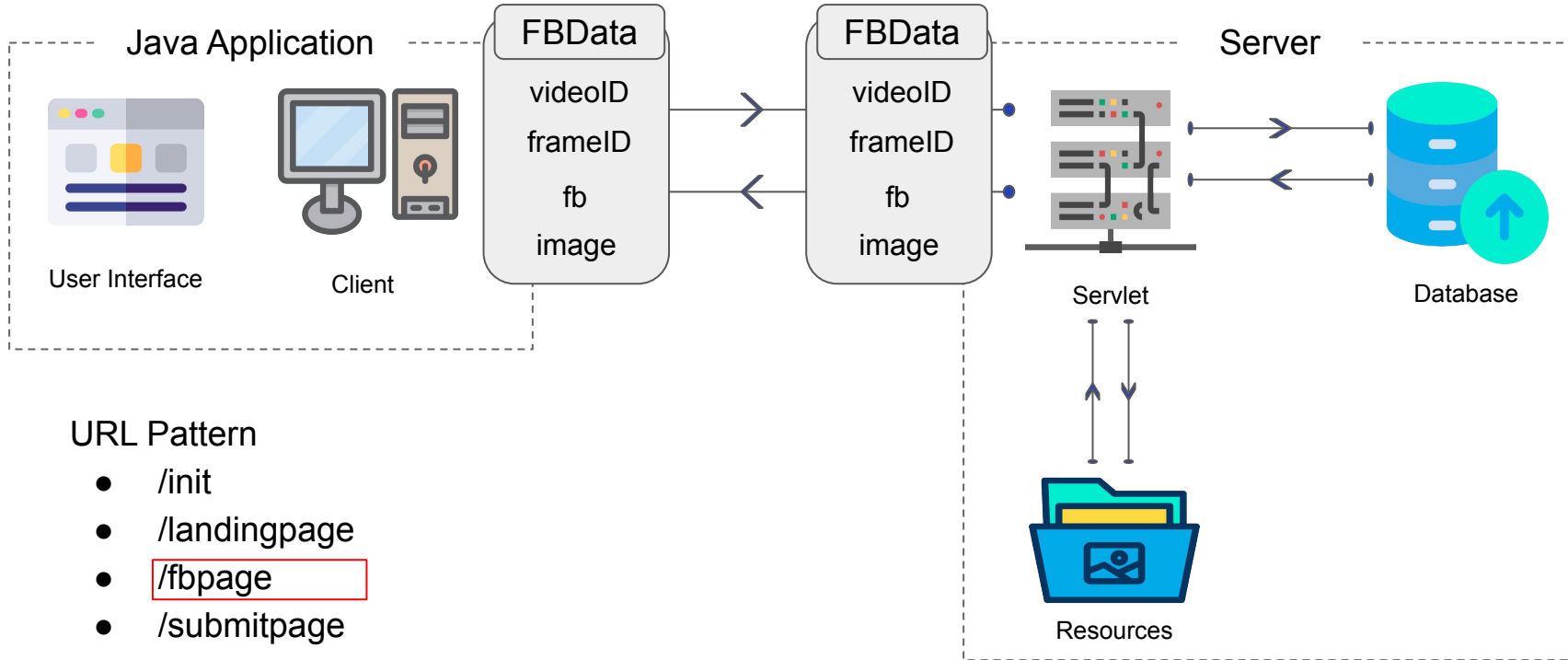
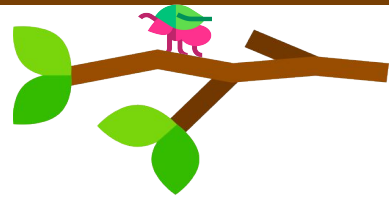
URL Patterns

- `/init`
- `/landingpage`
- `/fbpage`
- `/submitpage`

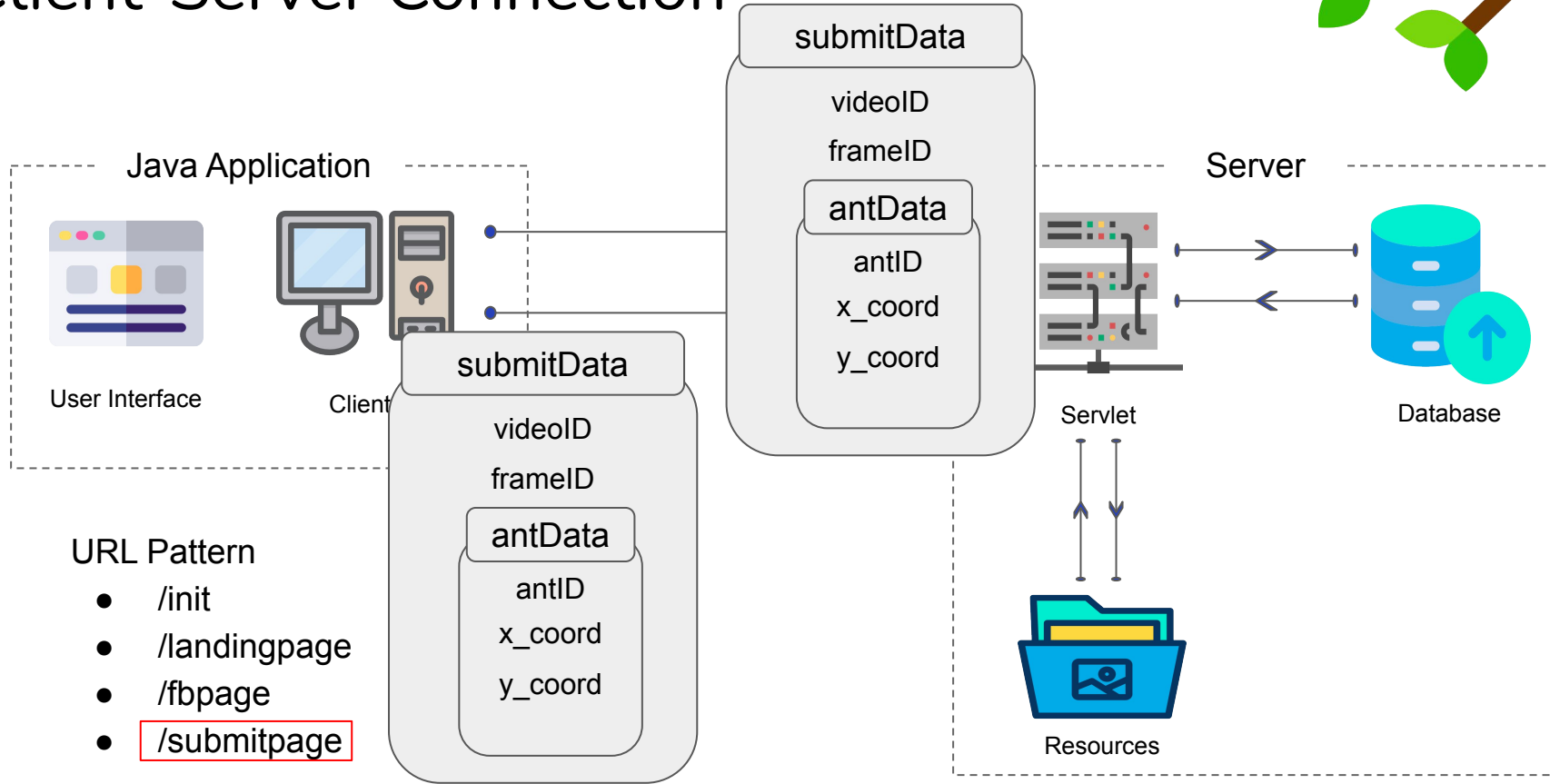
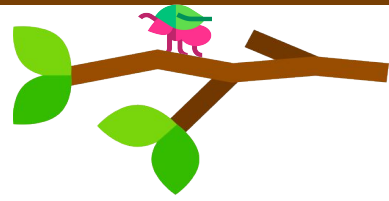
Client-Server Connection:



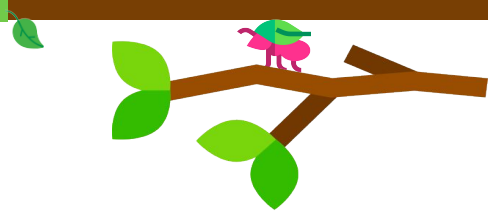
Client-Server Connection



Client-Server Connection



Database: Entity Relationship Diagram



Combination of these
attributes form the
composite primary key

| Coordinates |
|--|
| ant_id , int, NOT NULL, PK |
| frame_id , int, NOT NULL, PK |
| video_id , varchar(128), NOT NULL, PK |
| x_coord , int, NOT NULL |
| y_coord , int, NOT NULL |

Database: Management Tool



pgAdmin

File Object Tools Help

postgres/postgres@PostgreSQL 12

Query Editor Query History

```
1 SELECT frame_id, x_coord, y_coord
2 FROM coordinates
3 WHERE video_id = 'vid_5' AND ant_id = 1
4
5
```

1 pgAdmin allows administrator to interact with database using SQL queries

3 Queried data can be exported to local directory in CSV file format

2

| | frame_id integer | x_coord integer | y_coord integer |
|----|---------------------|--------------------|--------------------|
| 1 | 1 | 100 | 100 |
| 2 | 2 | 100 | 100 |
| 3 | 3 | 105 | 100 |
| 4 | 4 | 105 | 102 |
| 5 | 5 | 105 | 103 |
| 6 | 6 | 105 | 100 |
| 7 | 7 | 105 | 101 |
| 8 | 8 | 108 | 101 |
| 9 | 9 | 110 | 103 |
| 10 | 10 | 110 | 106 |

2 Data output from the SQL queries can be visualised directly

CSV

Database: Management Tool



pgAdmin File Object Tools Help

postgres/postgres@PostgreSQL 12

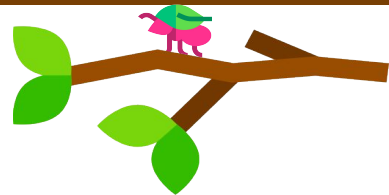
Query Editor Query History

```
1 SELECT frame_id, x_coord, y_coord
2 FROM coordinates
3 WHERE video_id = 'vid_5' AND ant_id = 1
4
5
```

Data Output Explain Messages Notifications

| | frame_id integer | x_coord integer | y_coord integer |
|----|---------------------|--------------------|--------------------|
| 1 | 1 | 100 | 100 |
| 2 | 2 | 100 | 100 |
| 3 | 3 | 105 | 100 |
| 4 | 4 | 105 | 102 |
| 5 | 5 | 105 | 103 |
| 6 | 6 | 105 | 100 |
| 7 | 7 | 105 | 101 |
| 8 | 8 | 108 | 101 |
| 9 | 9 | 110 | 103 |
| 10 | 10 | 110 | 106 |

Database: Management Tool



1

```
1 SELECT frame_id, x_coord, y_coord
2 FROM coordinates
3 WHERE video_id = 'vid_5' AND ant_id = 1
4
```

pgAdmin allows administrator to interact with the database using SQL queries



3

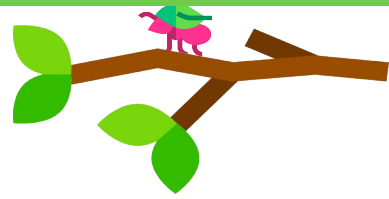
Queried data can be exported to local directory in CSV file format

2

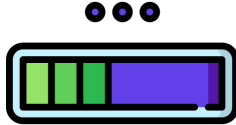
| | frame_id integer | x_coord integer | y_coord integer |
|----|---------------------|--------------------|--------------------|
| 1 | 1 | 100 | 100 |
| 2 | 2 | 100 | 100 |
| 3 | 3 | 105 | 100 |
| 4 | 4 | 105 | 102 |
| 5 | 5 | 105 | 103 |
| 6 | 6 | 105 | 100 |
| 7 | 7 | 105 | 101 |
| 8 | 8 | 108 | 101 |
| 9 | 9 | 110 | 103 |
| 10 | 10 | 110 | 106 |

Data output from the SQL queries can be visualised directly

Feedback from Fabian



Add visual feedback for each click



Add progress bar

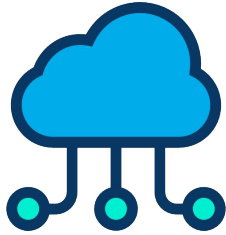
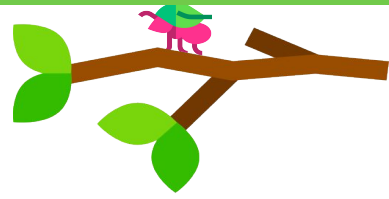


Warn unexpected user input

Verdict:



Next iteration

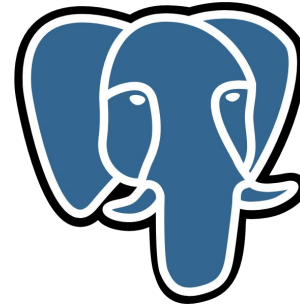
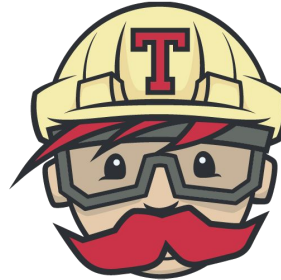
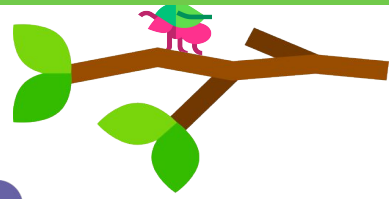


Deploy the local
server to Heroku

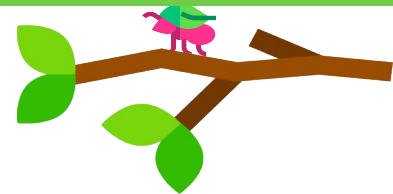


Implement new
features suggested
by Fabian

Tools Used:



Our Team



Front-end



Yi Teng Voon

Ants GUI
enhancement



Xian Zhang

Ants GUI design



Joshua Sia

Ants GUI
Functionalities

Back-end



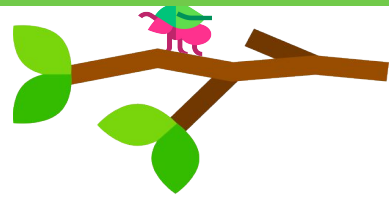
Winn Chanasak
Mahankarat

Ants Servlet



Cal-Vin Ng

Ants Database



Thank You!