PET DETECTION SYTSTEM

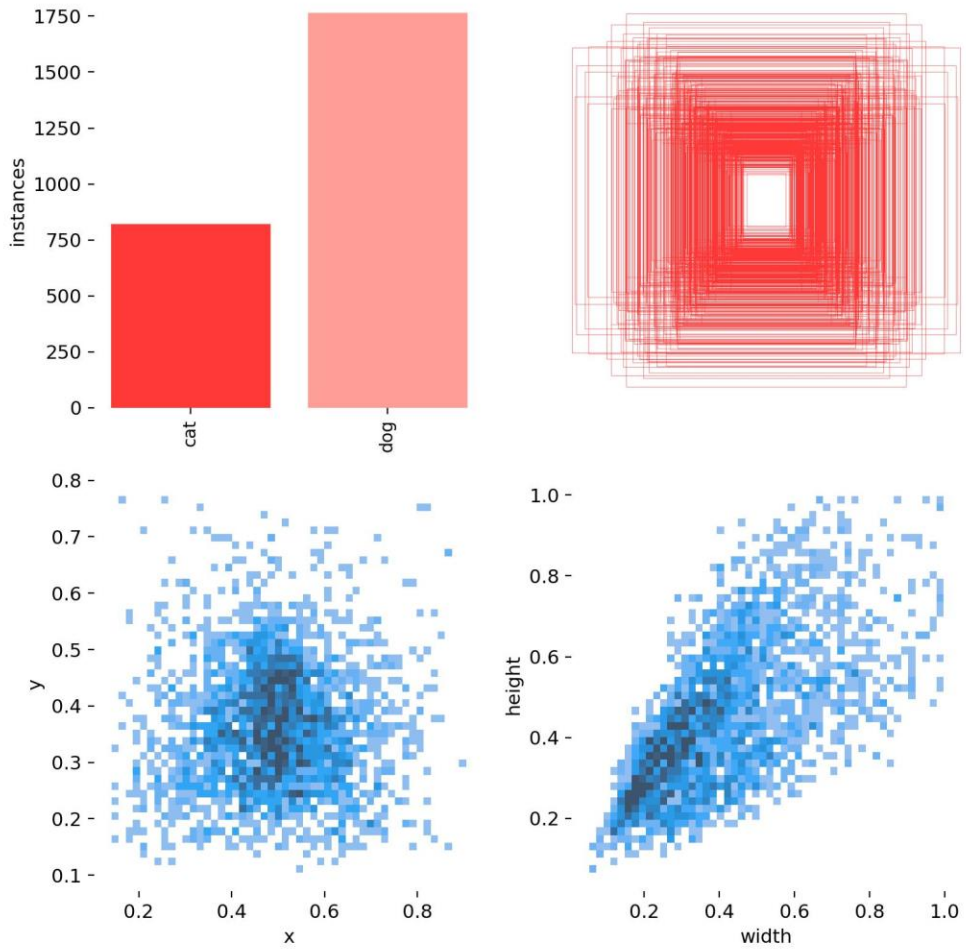
Cloud Computing SoSe23

Prof. Dr. Christian Baun

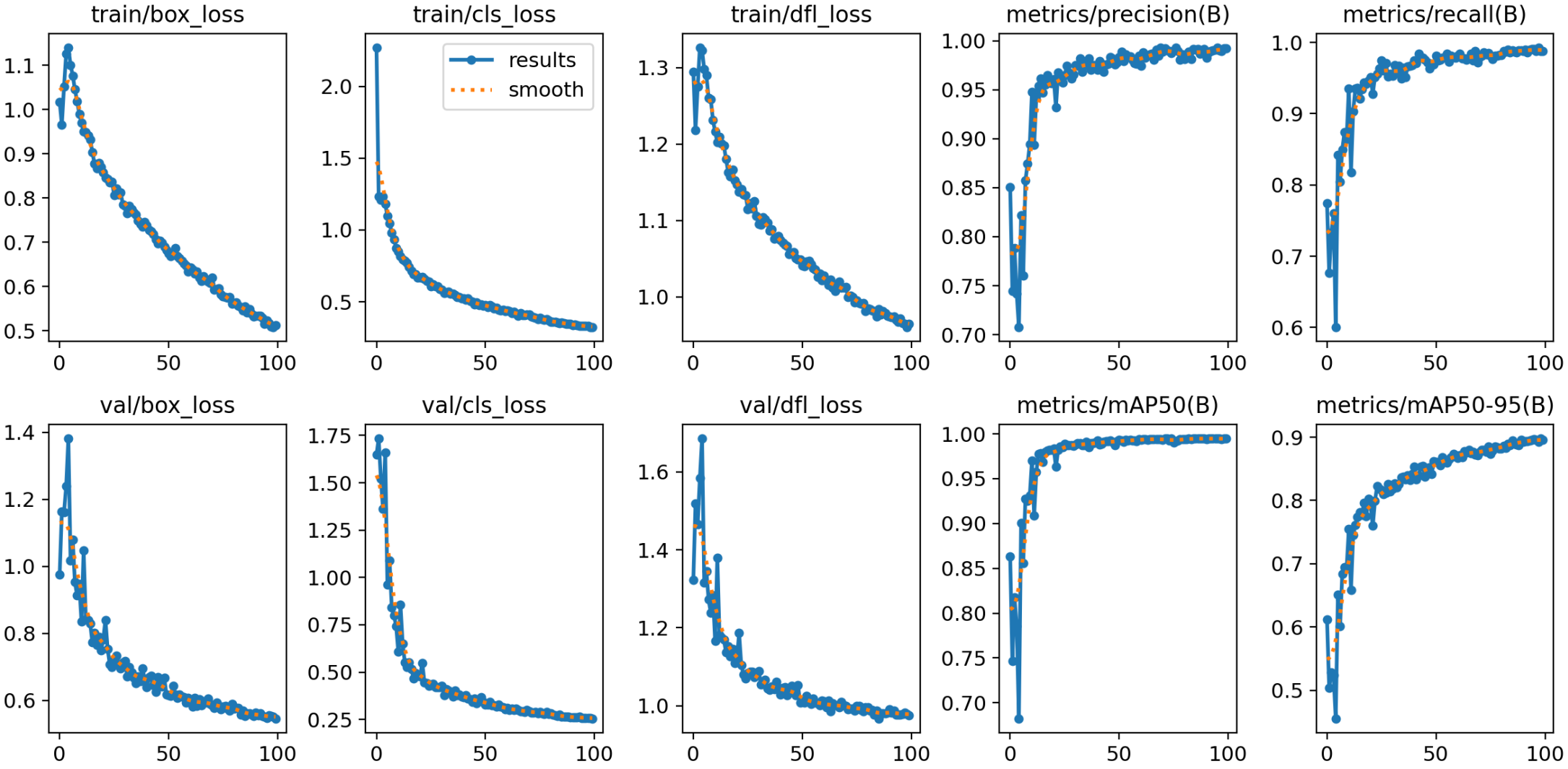
Team and Tasks

Hardware Setup (OS install Raspberry Pi, camera setup, etc) - All Team members
Model Training – Alberto
Cluster – Binit
API – Binyam and Krishna
Frontend (S3 Storage) - Klea and Monica
Report Documentation - All Team Members

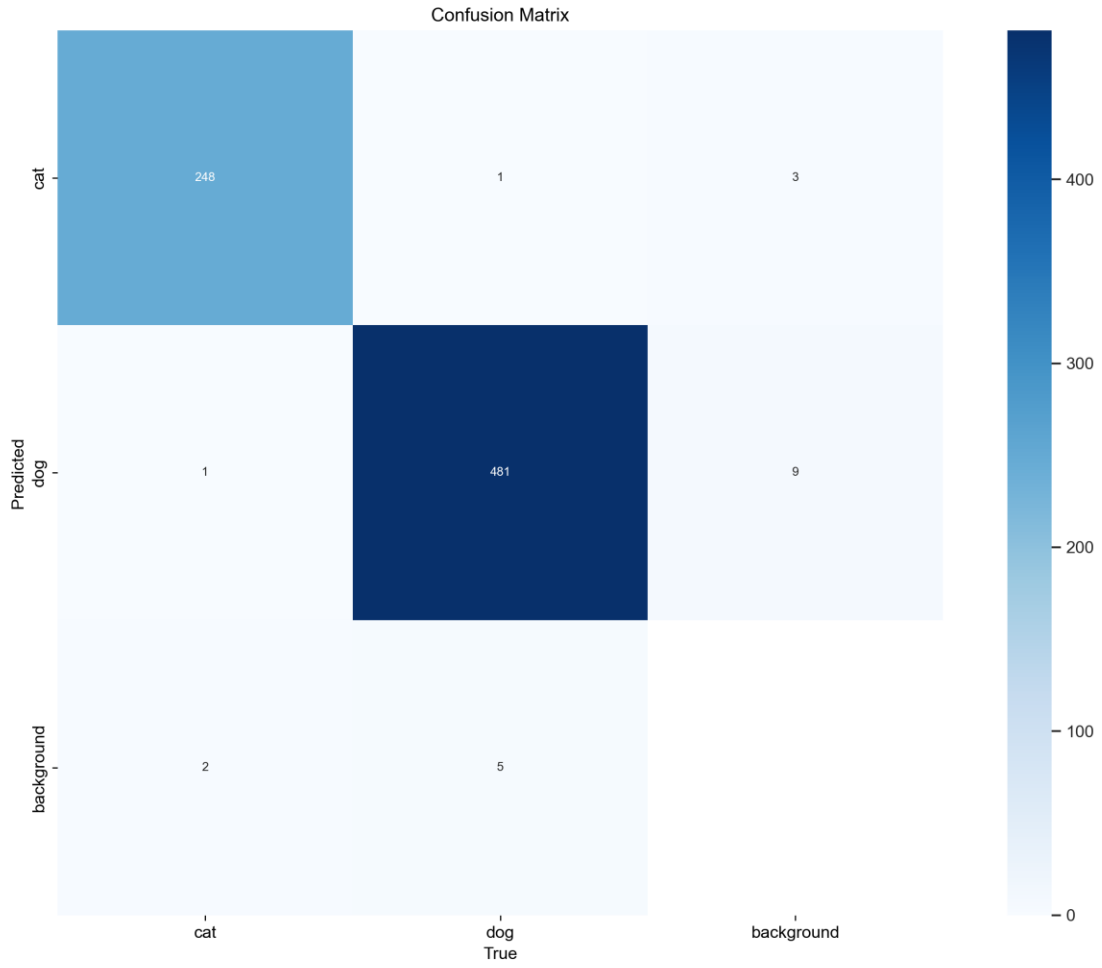
Our Model (Labels)



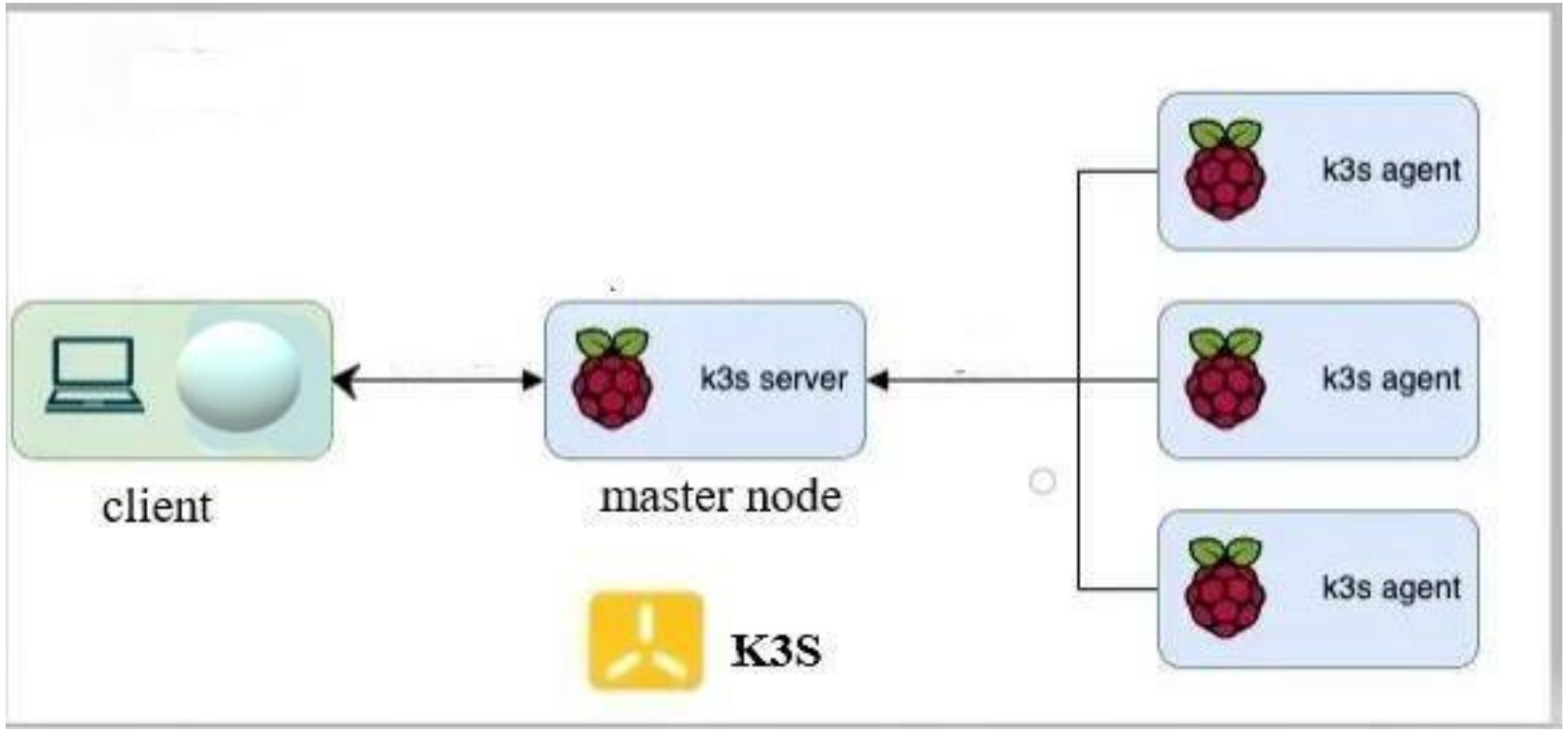
Our Model (Results)



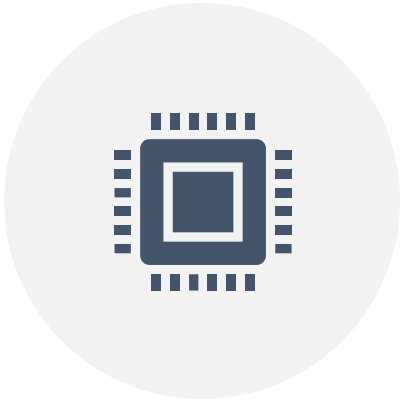
Our Model (Confusion Matrix)



Architecture

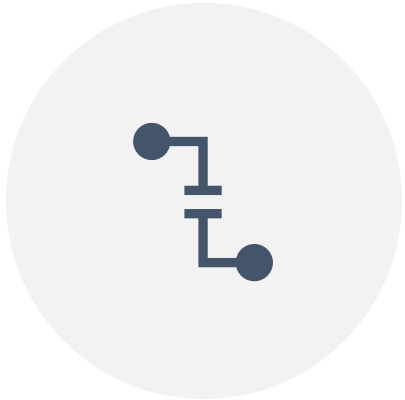


Kubernetes – Step 1

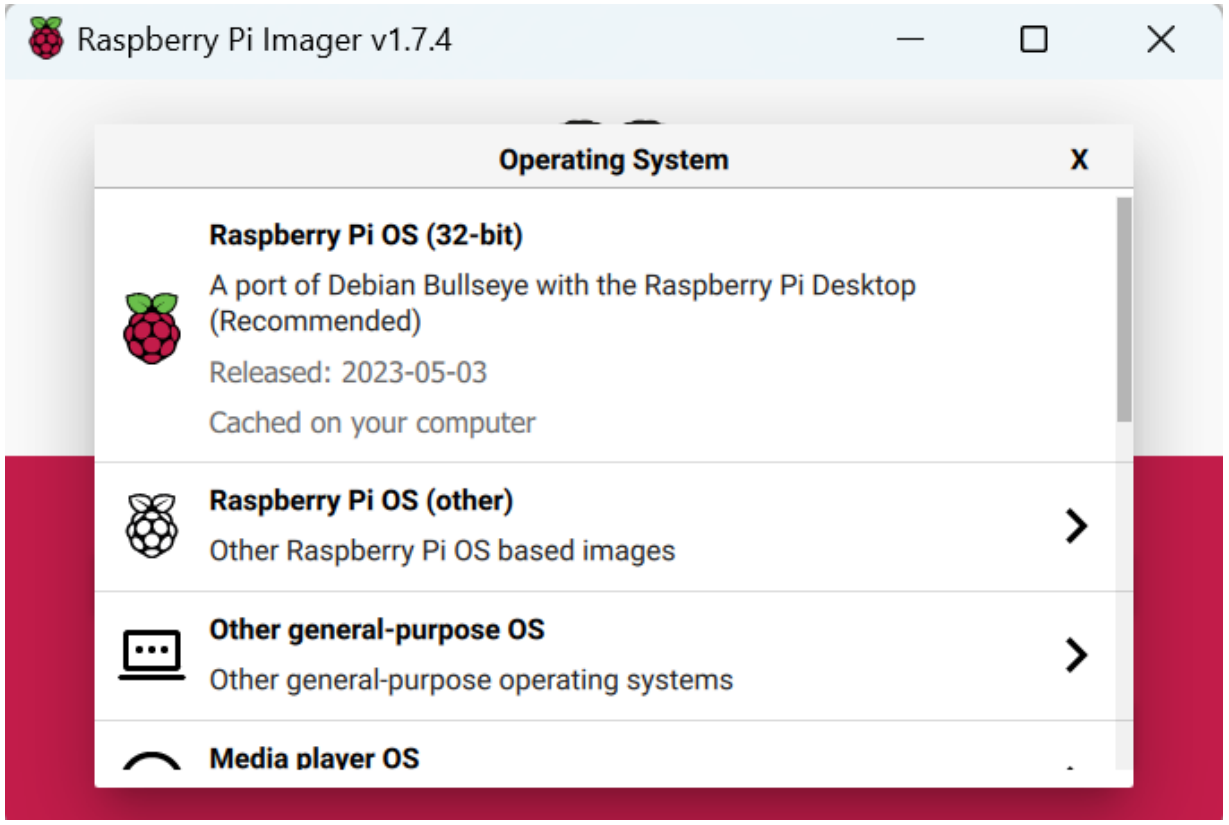


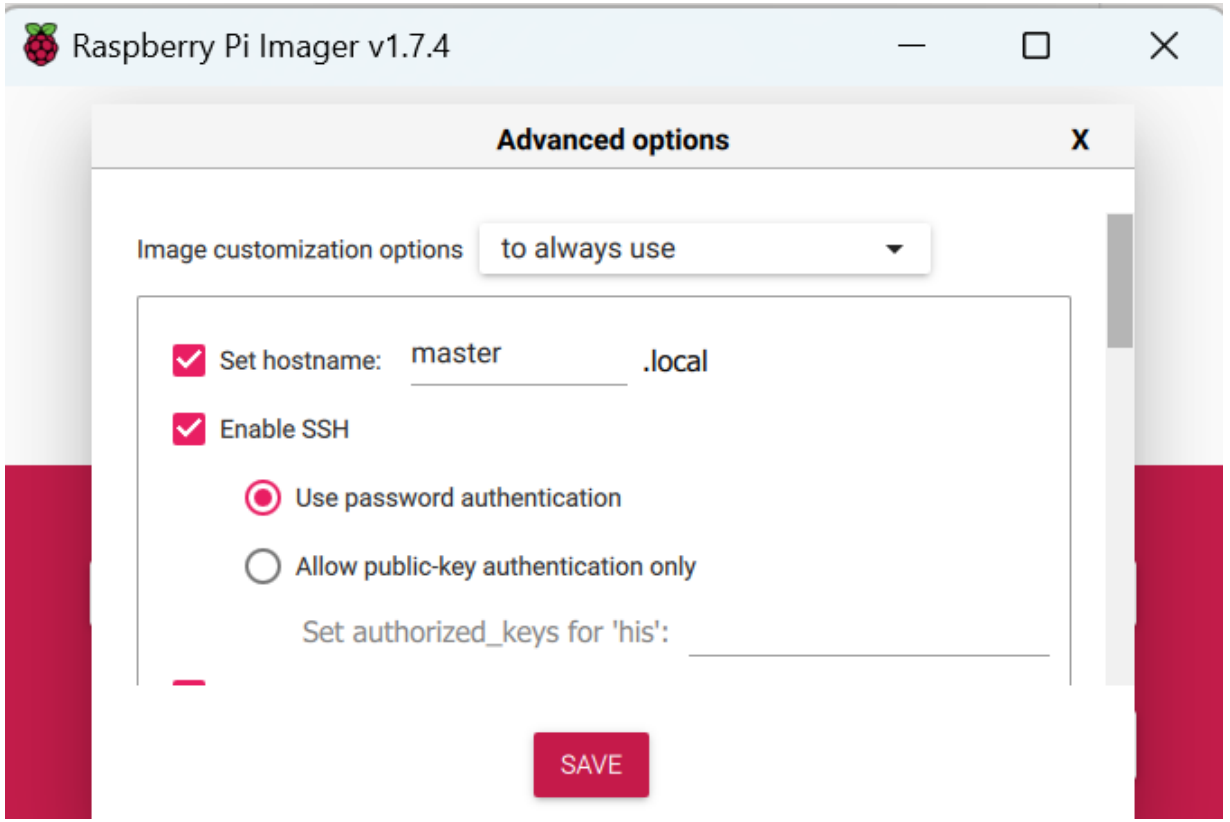
FLASH THE RASPBERRY PI OS(32-BIT) ON 4 RASPBERRY PI.

INSTALL K3S SERVER ON MASTER NODE OF K3S.



INSTALL K3S CLIENT ON 3 WORKER NODES OF K3S.


Raspberry Pi Imager v1.7.4
Operating System
X
Raspberry Pi OS (32-bit)
A port of Debian Bullseye with the Raspberry Pi Desktop (Recommended)
Released: 2023-05-03
Cached on your computer
Raspberry Pi OS (other)
Other Raspberry Pi OS based images
Other general-purpose OS
Other general-purpose operating systems
Media player OS

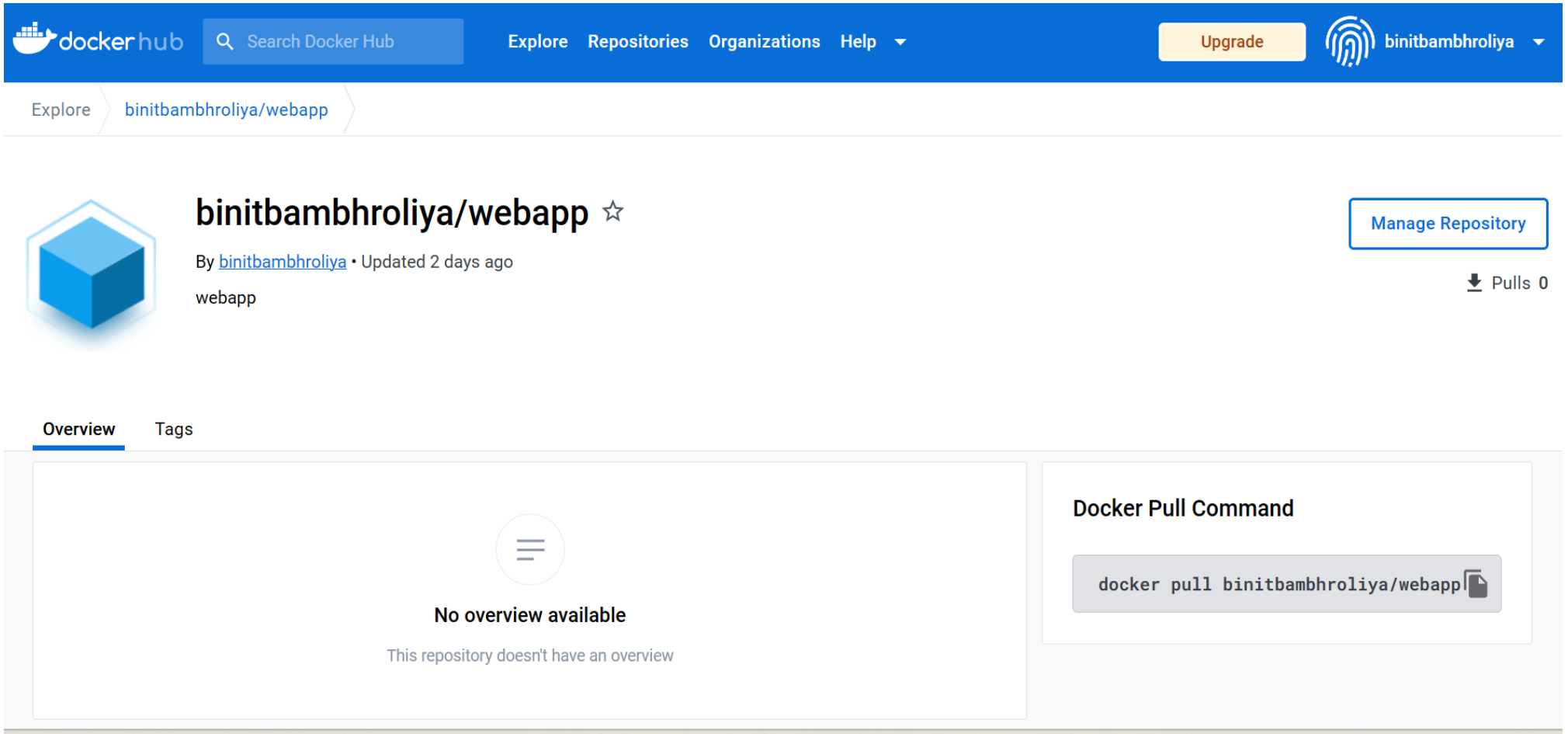

Raspberry Pi Imager v1.7.4
Advanced options
X
Image customization options
to always use
Set hostname:
master
.local
Enable SSH
Use password authentication
Allow public-key authentication only
Set authorized_keys for 'his':
SAVE

Kubernetes – Step 2

CREATE A DOCKER IMAGE OF SERVICES ON LOCAL MACHINE.

PULL ALL THE DOCKER IMAGES OF ALL THE SERVICES ON MASTER NODE OF K3S CLUSTER

Webapp Docker Image



Backend(API)

Node.js is a powerful JavaScript runtime

enables server-side

networking applications with event-driven

non-blocking I/O.

Backend Structure

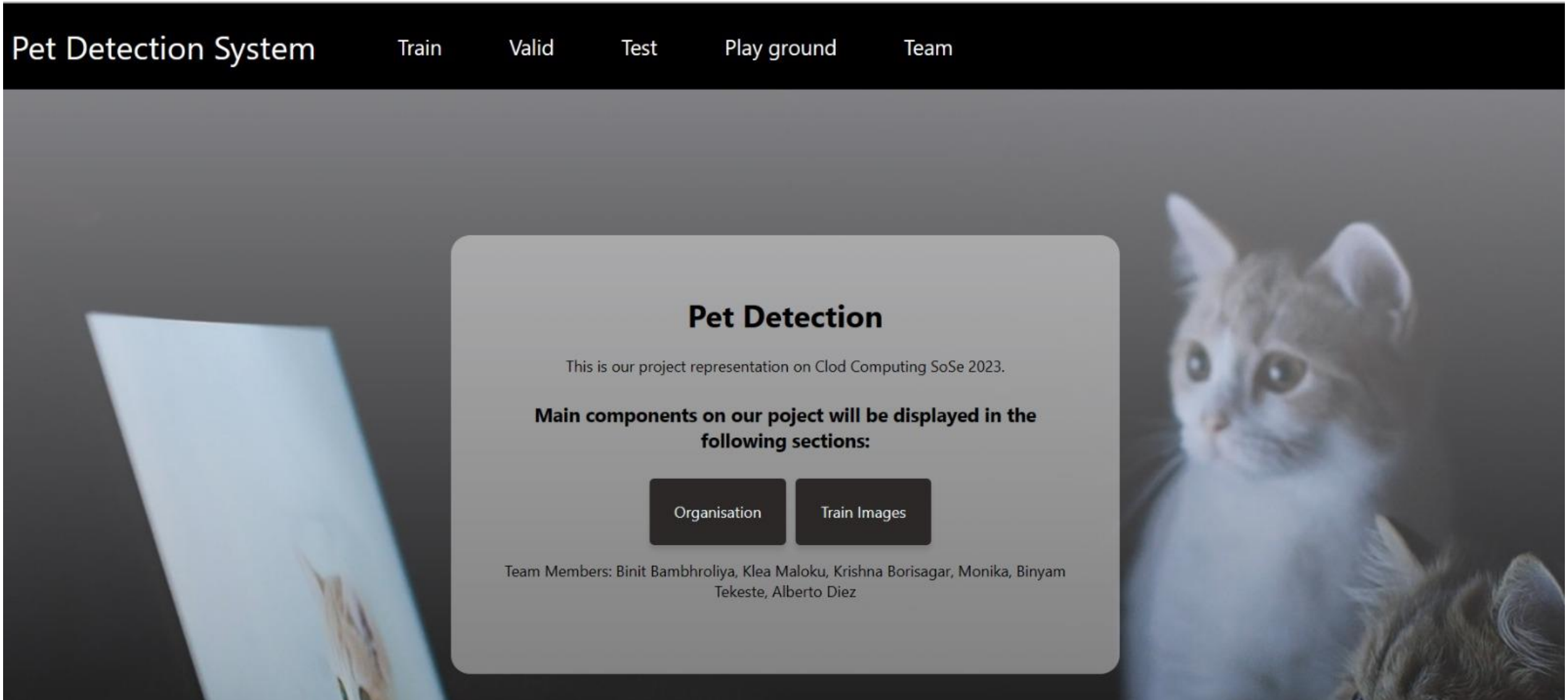
- Routing involves defining endpoints and associating them with appropriate functions.
- The logic for pre-and post-processing requests and responses is known as middleware.
- Controllers: Responsible for processing data and put business logic into action.
- Models: Data structure and database interaction.

Why AWS & AWS work

Learn how our Node.js API makes data retrieval easier by interacting with AWS databases. Benefit from asynchronous and rapid operations, scalability, and excellent performance. Investigate real-world use scenarios to understand how our solution improves the productivity and dependability of your web apps.

Our Node.js API effortlessly connects to an AWS database, enabling seamless handling of image data. Leveraging AWS services, our API supports efficient POST and GET operations for images, ensuring secure and reliable storage. Empower your application with robust image management capabilities using our integrated solution.

Frontend


Pet Detection System
Train
Valid
Test
Play ground
Team
Pet Detection
This is our project representation on Clod Computing SoSe 2023.
Main components on our poject will be displayed in the following sections:
Organisation
Train Images
Team Members: Binit Bambhroliya, Klea Maloku, Krishna Borisagar, Monika, Binyam Tekeste, Alberto Diez

Test Dataset

Pet Detection System | Train | Valid | Test | Play ground | Team

Test

Total number of images: 369

Play Ground

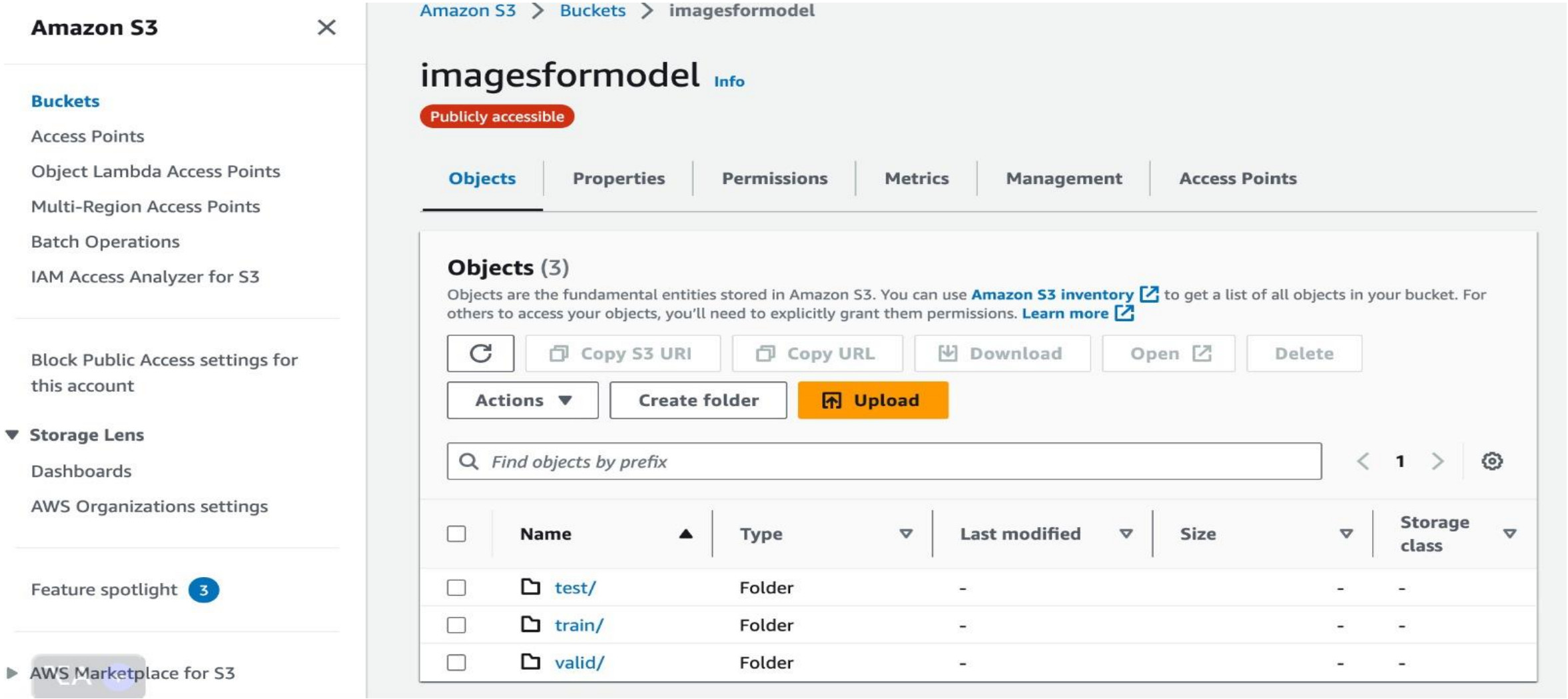
Pet Detection System Train Valid Test Play ground Team

Play Ground

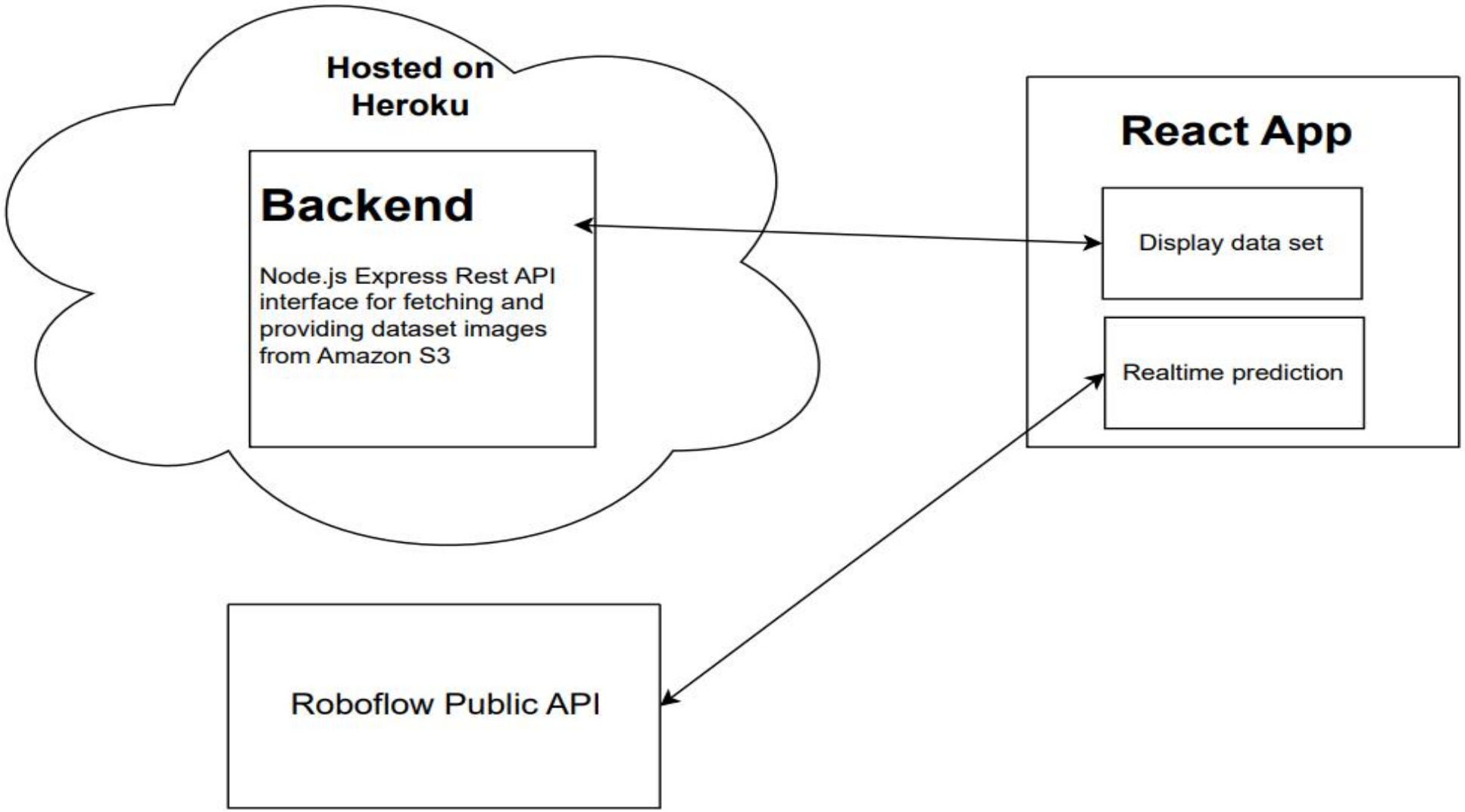
https://imagesformodel.s3.amazonaws.com/test/Bengal_109_jpg.rf.bc09892c234c8ff9372991d4d30dfbbf.jpg Submit


```
{
  "time": 0.5242936760000703,
  "image": {
    "width": 640,
    "height": 640
  },
  "predictions": [
    {
      "x": 409,
      "y": 190,
      "width": 238,
      "height": 344,
      "confidence": 0.8792015314102173,
      "class": "cat-Egyptian_Mau"
    }
  ]
}
```

S3 -Bucket


Amazon S3
Buckets
Access Points
Object Lambda Access Points
Multi-Region Access Points
Batch Operations
IAM Access Analyzer for S3
Block Public Access settings for this account
Storage Lens
Dashboards
AWS Organizations settings
Feature spotlight 3
AWS Marketplace for S3
Amazon S3 > Buckets > imagesformodel
imagesformodel Info
Publicly accessible
Objects
Properties
Permissions
Metrics
Management
Access Points
Objects (3)
Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more
Copy S3 URI
Copy URL
Download
Open
Delete
Actions
Create folder
Upload
Find objects by prefix
1
Name
Type
Last modified
Size
Storage class
test/ Folder - - -
train/ Folder - - -
valid/ Folder - - -

Diagram


Hosted on Heroku
Backend
Node.js Express Rest API interface for fetching and providing dataset images from Amazon S3
React App
Display data set
Realtime prediction
Roboflow Public API

Challenges and improvements

- Hardware working efficiency.
- K3s server didn't respond as lots of services running on Master node.
- IP of the Master node must be static for the connection of all worker nodes.
- Connect the Raspberry Pi, to AWS S3 instance.
- Represent live images captured in the webpage
- Train model to detect other pets.

THANK YOU!