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Biocial

(Edge Based Facial Recognition)

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ABSTRACT
AND
PROBLEM STATEMENT

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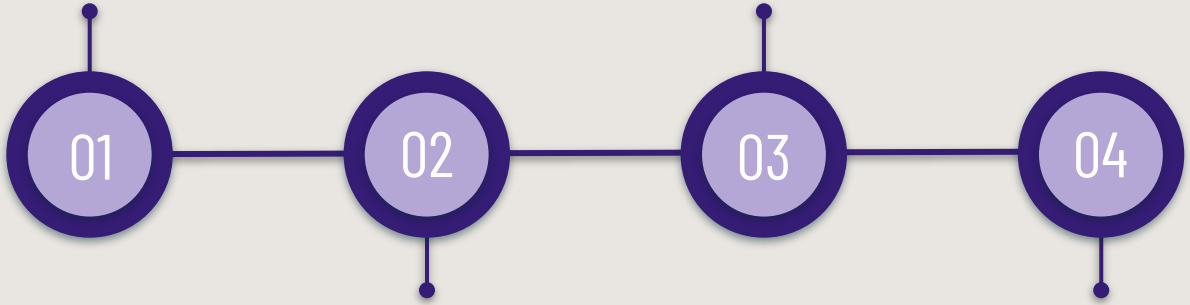
Abstract

We are in a pursuit of automating our day-to-day process and the full potential of biometrics verification process is yet to be utilized as we haven't completely moved to contactless biometrics verification systems.

This attempt to make use of a contactless biometrics verification system will increase our dependency on the internet.



And the recent corona threat has increased the need for a contactless system.

Solution

Using this project, we are trying to achieve an edge-based biometrics computation system that would reduce the network latency and optimize the process.

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Problem Statement

The recent corona threat has increased the need for a contactless system and also we have to reduce a network latency and network dependency.

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Understanding a Problem Statement:

01 To develop an edge based biometric system

02 Where the edge computation system caches a slice of appropriate data

03 Using a priority based heuristic algorithm

04 And reduce the network latency associated

INTRODUCTION AND EXAMPLE

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Introduction

We are in a pursuit of automating our day-to-day process and the full potential of biometrics verification process is yet to be utilized as we haven't completely moved to contactless biometrics verification systems.

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Example:

Our use case:

A University is trying to install a biometric verification system

- Consider campuses (A, B and C)
- Each campus has its repetitive set of students and faculties visiting regularly
- Students and Faculties visiting campus A are frequent visitors for that particular campus and visit the other two campuses on an ad hoc basis
- Our system caches records of frequent visitors on priority basis
- Which removes the dependency on the internet to perform biometrics verification for the frequent individuals

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OUR SOLUTION

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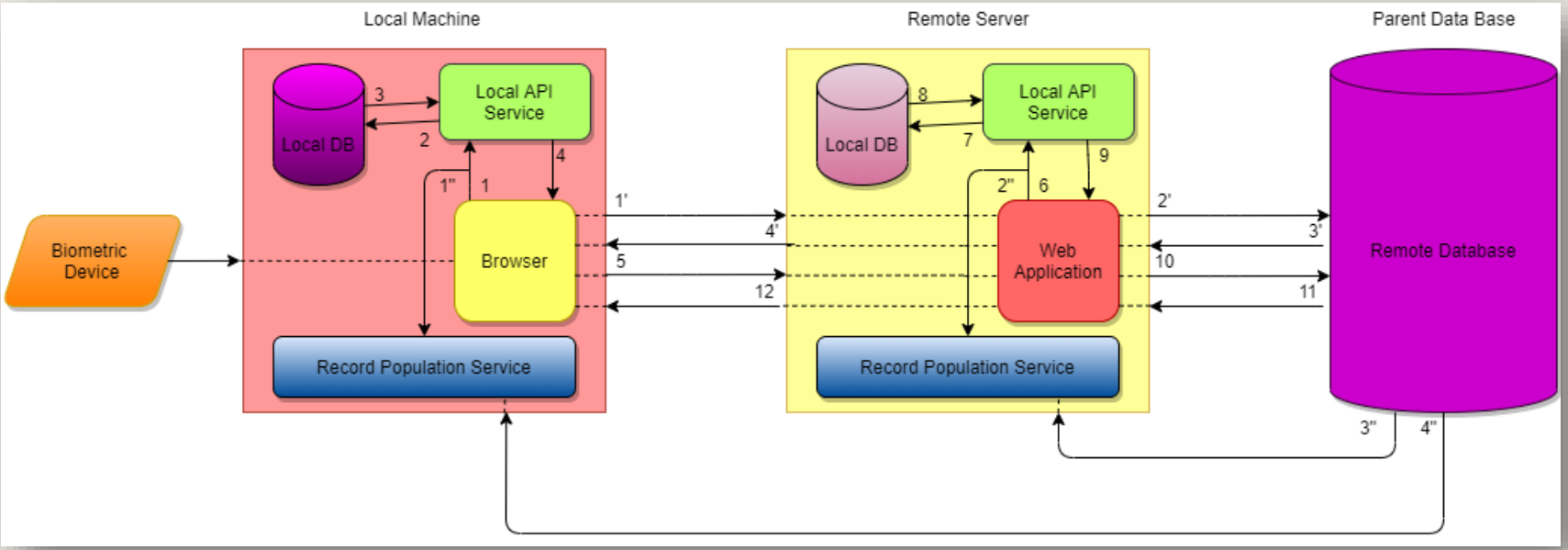
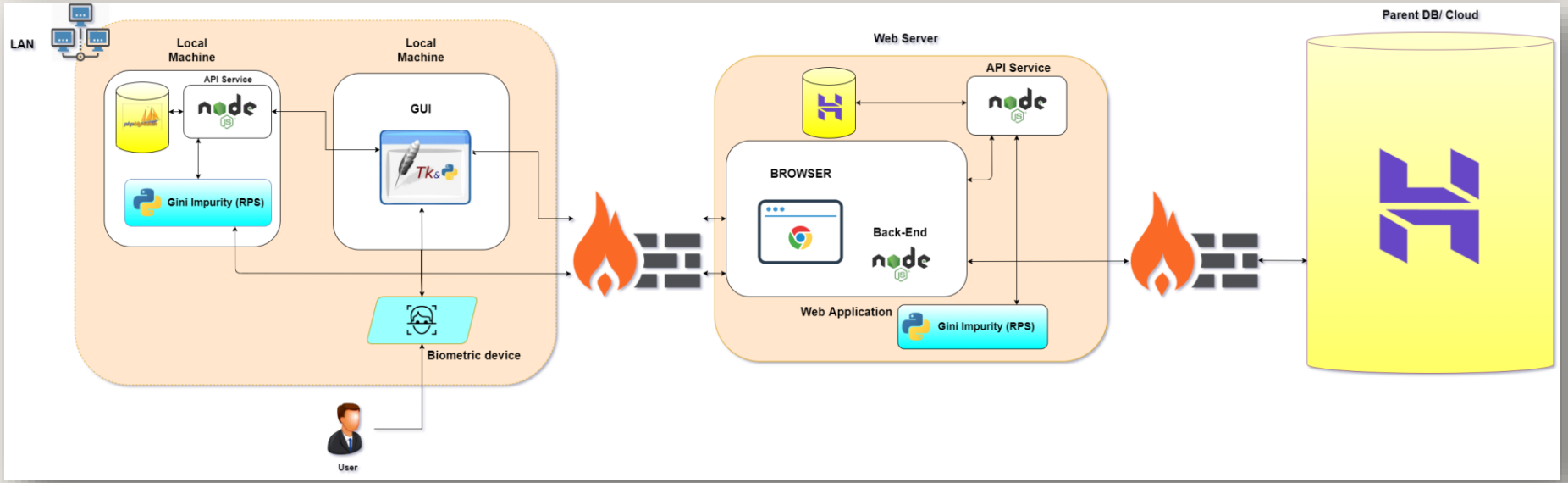
OUR SYSTEM ARCHITECTURE:

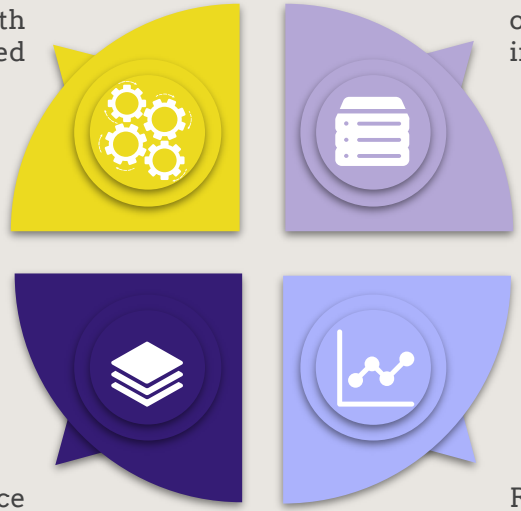


TECHINICAL ARCHITECTURE:



RECORD POPULATION SERVICE:

Record Population Service uses an ML algorithm and populates the local DB with the frequently accessed data.



The frequently accessed records are fetched from the collection of records from the Parent DB into the local machine

Record Population Service collects the frequent accessed data based on the frequency of the data

Record Population Service uses GINI Impurity Algorithm to categories the frequent data's.

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ALGORITHM:

Gini Impurity:

- Randomly pick a data point in our dataset, then
- **Randomly classify it according to the class distribution in the dataset**. For our dataset, we'd classify it as blue 5/10 of the time and as green 5/10 of the time, since we have 5 data points of each colour.
- **What's the probability we classify the data point incorrectly?** The answer to that question is the Gini Impurity.

CALCULATION:

	D1	D2	D3	D4	D5	D6	D7	F
x_1	0	0	0	0	1	1	1 =	18
x_2	1	1	1	1	0	0	0 =	10
x_3	0	1	0	1	0	1	1 =	19
x_4	1	1	1	1	1	1	1 =	28
x_5	0	0	1	1	1	1	1 =	25

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FORMULA:

If we have 7 total classes and $p(i)$ is the probability of picking a datapoint with class i, then the Gini Impurity is calculated as

$$\sum_{n=1}^{7} \mathbf{x}. \boldsymbol{D}_{\mathbf{n}}$$

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COMPARISION:

Features	ZENTECH	ADONAI	BIOMATIQUES	BIOCIAL
Control over data system				
Optimization in network latency				
Estimation computation				
Data security				
Network dependency				

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DEMO

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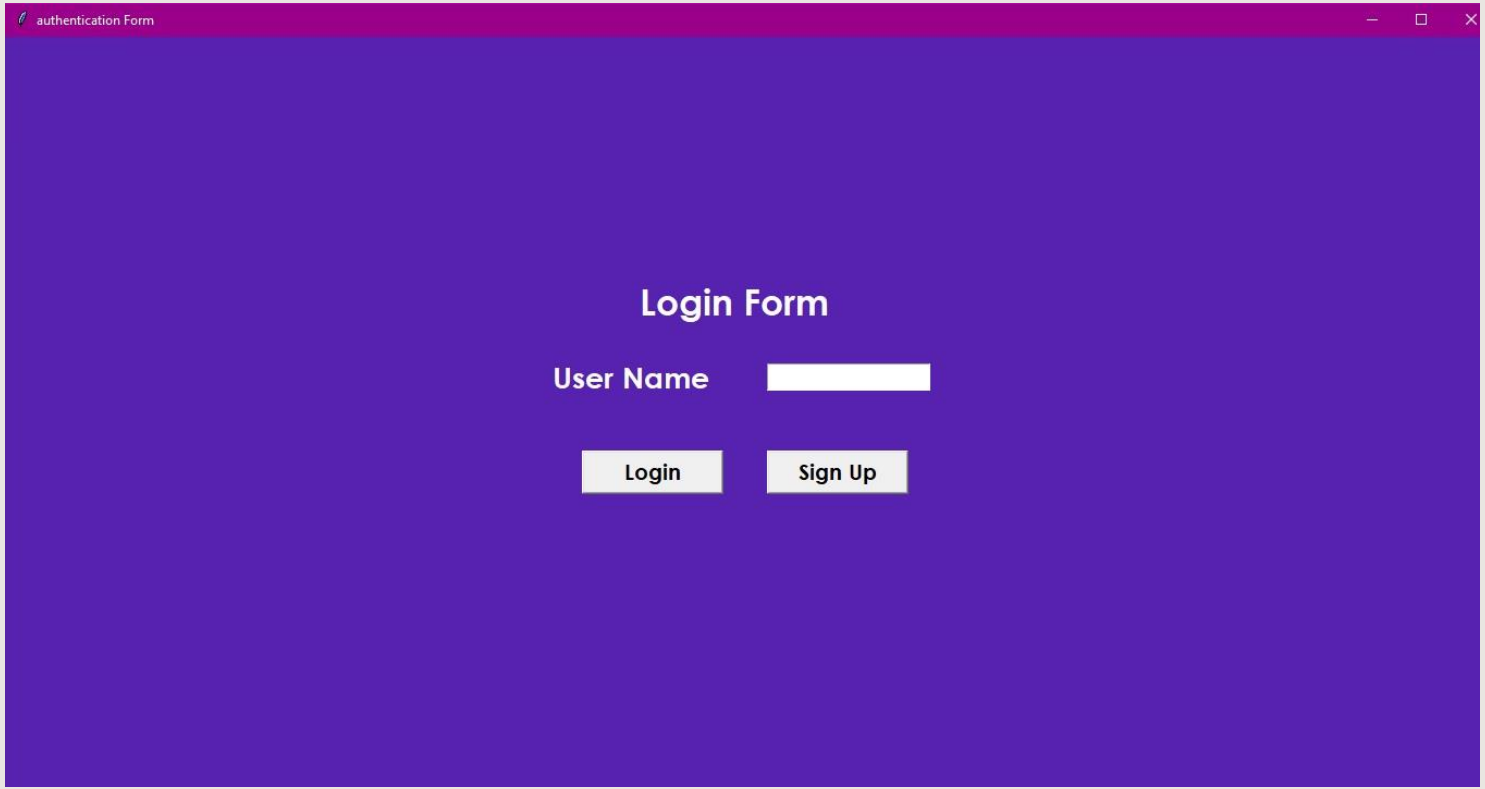
UI:



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CASE 1

- Signup: User1, User2, User3.
- They login everyday.
- At the end of every week the RPS is initiated to calculate the frequency for the users.
- Based on their frequency level, the user data is placed at local database and at the server.

CASE 2

- A new user signup.
- Initially the data is stored at the local database of the machine.
- Once if the RPS is initiated, the frequency will be calculated for new user along with the old user.
- The remaining process is same has the CASE 1.

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Live Demo

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SERVER DETAILS:

WEB HOSTER:	HOSTINGER
HOST:	'156.67.222.175'
USER:	u651328475_facedetection
PASSWORD:	'Facedetection123'
DATABASE:	u651328475_facedetection

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Use Case:

Any place where biometric verification is necessary:

- IT sector
- College campuses
- Immigration border security

System Requirements:

Processor : Intel Core i5-8365U Processor
RAM : 8GB DDR4 2400 RAM
HDD/SSD : 500GB(HDD)/120 GB (SSD)
OS: Microsoft Windows

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RESULT

The result is to come up with an edge-based biometric verification system which gives the same results as the existing system through an optimized process than that of the existing system.

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THANKS

(From Team Biocial)

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Q&A