Augmented Reality Application

Submitted in partial fulfillment of the requirements of the degree of

B.E in Computer Engineering

By

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Project Synopsis Report Approval for B.E.

This the project entitled "***Augmented Reality Application***" by **"*Himanshu Chhatpar (06)*", "*Prashant Dudhal(13)*", "*Sankalp Kadam (26)*"** is approved for the degree of **Bachelor of Engineering in Computer Engineering**.

Date: _____

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Internal Examiner **External Examiner**

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Chapter – One

Introduction

1.1 Abstract

Augmented Reality is one of the recent advancements in computing technologies which allows users to experience virtual objects in real world. The emergence of Augmented Reality has large scale applications in various fields including but not limited to gaming, education, E-commerce and military applications. It is observed implementing Augmented Reality solutions in any field still poses a great technical challenge. The following paper aims to reduce the technical knowledge required to use AR solutions, especially in the field of E-Commerce. The proposed solution is to provide the existing E-Commerce websites a SDK to incorporate AR features in their platform and avoiding the tedious task of implementing their own AR system. The paper proposed an SDK that could be built to serve majority of E-Commerce websites needs, to add AR functionality to the E-Commerce websites with minimal changes in their platform.

1.2 Proposed Problem

In today's world, e-commerce giants such as Amazon and Flipkart have rooted their impact in our lives to a very huge extent. In fact, even during the pandemic these companies have managed to not only sustain but also to increase their revenue. Today we order everything from grocery to electronics on these ecommerce platforms. But while ordering plethora of products we often tend to ruminate on what is best for us. We are unable to make a quick decision and purchase the product. Rather we continue to imagine the product and its impact after we purchase it.

Presently, the problem with existing systems is that, it is not able to provide a lucid understanding of existing products to the customers. This leaves the customers to imagine and discern the various specifications of product such as height, width, color and many more, all by themselves. Existing system lack the ability to provide a comprehensive visual aid to the customers. Various business statisticians hypothesize that by providing visual experience of variety of products will help to exalt the company's revenues and various experiments corroborate this hypothesis by providing relevant evidences and conclusions.

Therefore, it is recommended that ecommerce websites try to encompass technologies which permit them to provide visual aid to the customer. And one such technology is Augmented Reality or abbreviated as "AR". Augmented Reality allows its user to experience the digital components in real-world. Thus, enabling the user to gather a profound understanding about something. Ecommerce businesses can embrace this concept Augmented Reality to provide it's customers with a better sense of their products enabling them to make decisions quicker and thus resulting towards a growth in company's overall performance.

1.3 Definition and explanation

Augmented Reality: SDK for Ecommerce Websites is a web-based application which acts as comprehensive system for incorporating and managing the existing system which have implemented the AR capabilities within their websites. The application provides a solution which allows to outsource the entire AR features of your website to external application without having to lose control over your existing websites. It also helps to debar the sharing of data between the existing websites and the AR service thus assuring confidentiality of the business. The solution provides a SDK which allows the existing sites to incorporate AR features with only a few lines of code and discourages the practice of implementing this feature on their own which might be capital intensive.

1.4 Aim and Scope

The following project will help in creating a platform which will allow the users to implement Augmented Reality features in their existing websites without having to worry about the problems of managing and creating their own systems for handling the AR capabilities. It will act as an ancillary for ecommerce businesses in their goal to provide visual aid to the customers. The main aim of this project is to alleviate the arduous process of implementing the AR capabilities in existing websites.

Chapter – Two

Literature Survey

2.1 Published Papers

Author	Title	Published at	Abstract
Riya Aggarwal, Abhishek Singhal	Augmented reality and its effect on our lives	2019 9th International Conference on Cloud Computing, Data Science & Engineering (Confluence)	This paper gives information about Augmented Reality and how it started. It analyses various types of augmented reality, its applications and its advantages and disadvantages. This paper also gives us knowledge regarding those major threats that augmented reality will face in the near future and about its current and future
Pietro cipresso, Irene Alice Chicchi Giglioli, Mariano Alcañiz Raya and Giuseppe Riva	The Past, Present, and Future of Virtual and Augmented Reality Research: A Network and Cluster Analysis of the Literature	Frontiers in psychology	Helps us to understand the statistics and existence of AR in today's world

Shao-NIng Chang, Wei-Lun Chen	Does visualize industries matter? A technology foresight of global Virtual Reality and Augmented Reality Industry	2017 International Conference on Applied System Innovation (ICASI)	This study tends to figure out the industrial trends and technology foresight of Virtual Reality (VR) and Augmented Reality (AR) Industry, including the business trends, food chain, ecosystem, technology foresight, and future direction
Changmin Lim, Chanran Kim, Jong Li Park, Hanhoon Park	Mobile Augmented Reality Based on Invisible Marker	IEEE International Symposium on Mixed and Augmented Reality (ISMAR-Adjunct)	This paper proposes an approach for implementing marker-based augmented reality (AR) on smartphone. Specifically, to resolve the obtrusiveness of visual markers, use of infrared (IR) markers that are not visible to the human eye is studied
Huidong Bai, Lei Gao, Jihad El-Sana, Mark Billinghurst	Markerless 3D gesture-based interaction for handheld Augmented Reality Interfaces	IEEE International Symposium on Mixed and Augmented Reality (ISMAR)	The goal of this research Paper is to develop a natural interaction technique for manipulating virtual objects in 3D space on handheld AR devices.
Selcen Ozturkcan	Service innovation: Using augmented reality in the IKEA Place app	Jornal of Information Technology Teaching Cases 11	This research paper is about IKEA Place application (AR Application made by IKEA Furniture Company)

2.2 Study Of Existing Systems

Company Name	Type Of Service	Description
Amazon	Standalone Application	Amazon has implemented only uptil 360 images for some of its products
IKEA	Standalone Application	Currently its standalone AR application is still under RND and has not yet been released for public usage
Pokemon Go	Standalone application	Used Augmented Reality in game
Shopify	Website services provider	Allows only its customers to integrate AR within their website

Chapter – Three

Methodology

3.1 Technologies Used

1) FRONTEND:

Vue.js:

- Vue.js is an open source front end javascript framework
- Vue is a progressive framework for building user interfaces. The core library is focused on the view layer only.
- Vue.js is used to build a composable and reusable component which allows it to be replicated easily on the web.

Model-Viewer:

- The <model-viewer> web component can be used to view and interact with 3D models on the web, and it seamlessly transitions to placing and interacting with those 3D models in Augmented Reality on the web.
- With the help of model viewer we can now easily embed 3D objects onto web pages and interact with them through modern browsers without any special software or applications.
- It's a cross platform which can work on ios as well as android and also uses the new Web XR Device API technology if supported

2) Backend:

Django Rest Framework:

- Django is a Python-based free and open-source web framework that follows the model–template–views architectural pattern.
- The Django REST Framework is a flexible and robust tool kit that makes it easy for developers to build web APIs.

Cloudinary:

- Cloudinary is an end-to-end image- and video-management solution for websites and mobile apps, covering everything from image and video uploads, storage, manipulations, optimizations to delivery.
- Cloudinary allows the proposed system to manage images and video in the cloud, edit and transform on the fly, and optimize performance on any screen using Cloudinary's SDKs, Widgets and Integrations

Sqlite Database:

- SQLite is a C-language library that implements a small, fast, self-contained, high-reliability, full-featured, SQL database engine.
- SQLite is an embedded SQL database engine. Unlike most other SQL databases, SQLite does not have a separate server process. SQLite reads and writes directly to ordinary disk

files. A complete SQL database with multiple tables, indices, triggers, and views, is contained in a single disk file which allows the application to be as light weight as possible.

3.2 Functionalities

Registration:

- Each E-Commerce Website first needs to Register on a website provided by the proposed system.
- The simple registration requires E-Commerce Website's Name, Location, Registration Id and a password.
- Once the E-Commerce Website is successfully registered, the proposed system generates a token unique to the system and provides it to the E-Commerce Website.

CRUD Dashboard:

- The proposed system provides a Dashboard, through which the E-Commerce website can upload their gltf models along with some additional information to the proposed system.
- The uploaded CRUD Dashboard allows CRUD operations on the gltf models.

AR Enable Button:

- The proposed system provides a Vue Component Button, that accepts props(parameters like product-id) to render the Given Component in AR.
- Being a Component, the button is highly reusable and provides an easy integration into the E-Commerce Websites.

3.3 Methodology / Project Workflow

1) Project Workflow for an Unregistered E-Commerce Website

1. The Unregistered E-Commerce website should first register at the website provided by the proposed system.
2. The proposed system will then generate a token, which should be entered at the required position inside the Vue Component.

2) Project Workflow for a Registered E-Commerce Website

1. Once an E-Commerce Website registers, it gets access to CRUD Dashboard, which allows companies to upload thier gltf models along with some additional information to the proposed system
2. The CRUD Dashboard also allows Updation, Deletion and Read operations on the models
3. The E-Commerce website also gets a token with which token authentication will be performed by the proposed system.
4. The E-Commerce website can now access the proposed system's API through the Component and the token and can get AR Enable Button
5. The E-Commerce website needs to integrate the Component inside the website and pass it appropriate props and the token through which the system can function properly.

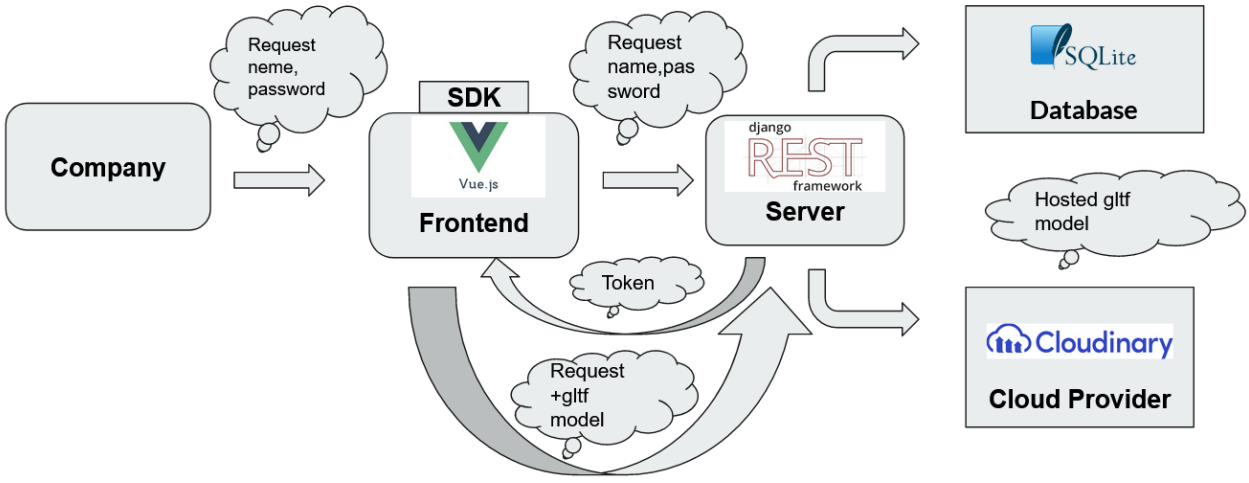

Fig 1

Use Case Diagram :

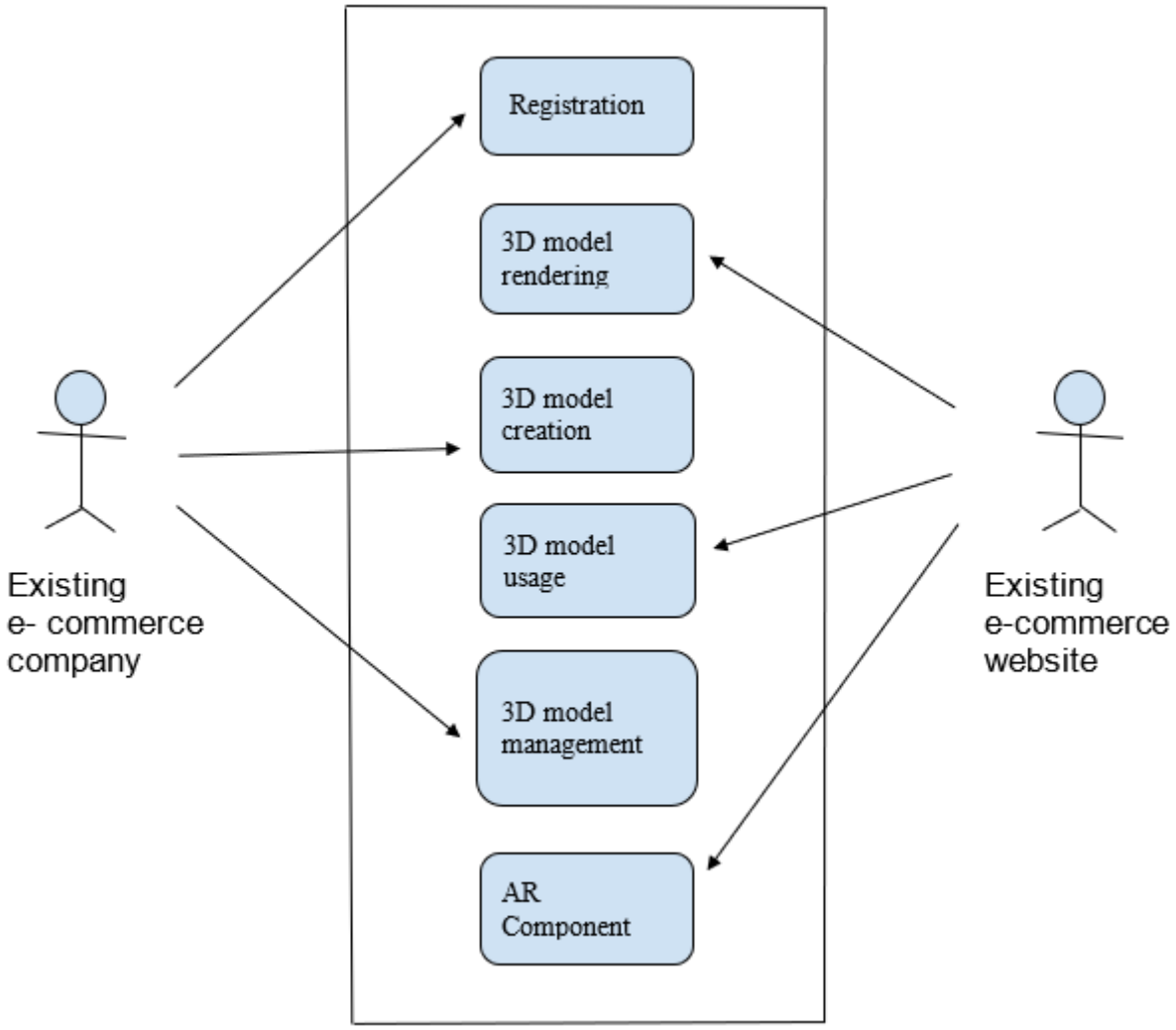

Fig 2

Chapter – Four

Results and Discussion

4.1 Current Outcomes

The developers of the proposed system are aiming to make the system as lightweight as possible and which in-turn would make it faster. The developers at this moment are ready with the API which will be used to access all the information and the various 3D models of the business. The developers are also ready with the authentication and registration of the companies and also has implemented the complete database architecture.

Chapter – Five

Conclusion

5.1 Conclusion

The proposed system will help the e-commerce websites to incorporate AR capabilities and will allow them to provide a visual aid to the customers. This will help to improve their business as it would lead to increased customer satisfaction and will allow them to purchase products by experiencing it in the real world.

Augmented Reality is a popular technology with applications in various fields. Its potential in e-commerce is still untapped. The proposed system will allow the existing e-commerce websites to utilize the potential of Augmented Reality to a certain extent and allow the customer to experience the product to its complete extent.

Augmented Reality has paved its way into the e-commerce industry with so many companies trying to implement it in their business. The proposed system will ease this task and allow these businesses to leverage full capabilities of AR and inhibit them from investing time and money into its implementation.

5.2 Scope for Future Development

The Web Application is going to create a platform for existing E-Commerce Websites, with which they can suscribe to the AR functionalities provided by the proposed system. Right now the proposed system only provides a Vue Component, which can be reused modularly by the E-Commerce Website.

The proposed system can easily be extended further by creating a Component for all major JavaScript frameworks like React, Angular and Svelte. The proposed system can also be upgraded to other databases like Postgres or NoSQL databases like MongoDB for scaling purposes.

The proposed system can further be optimized by using Multi-Threaded servers to handle and route multiple API requests or shifting to a eco-system like Golang or Java which provides all these features inbuilt.

Chapter – Six

Appendices

6.1 Screenshots

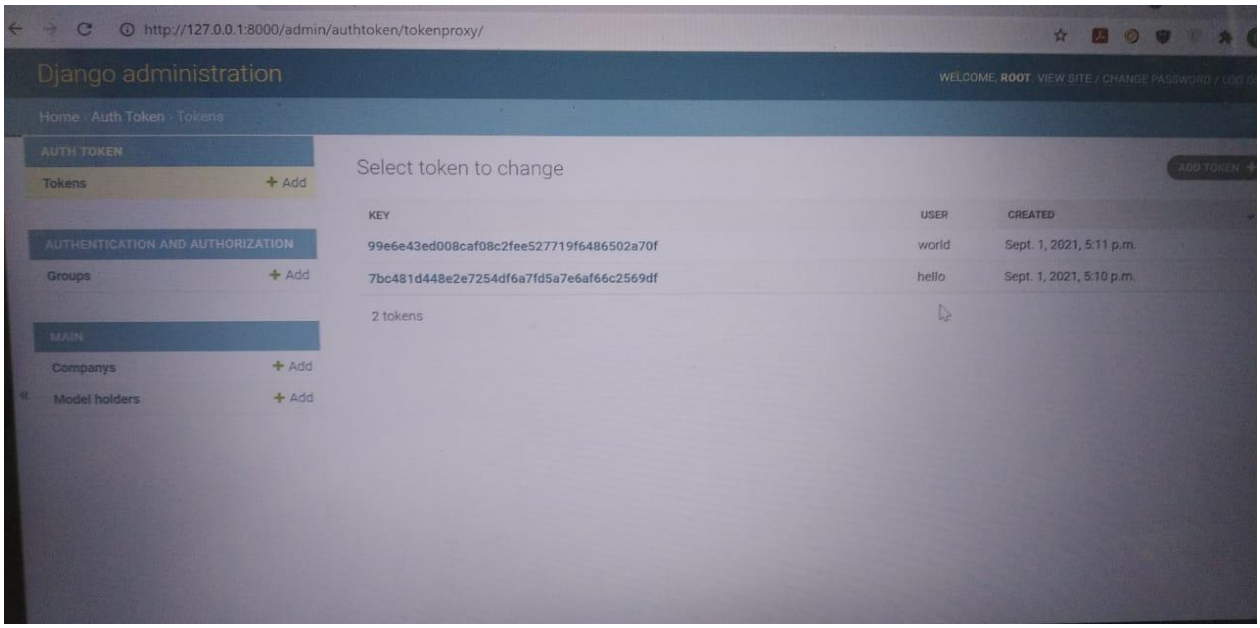

Fig 3

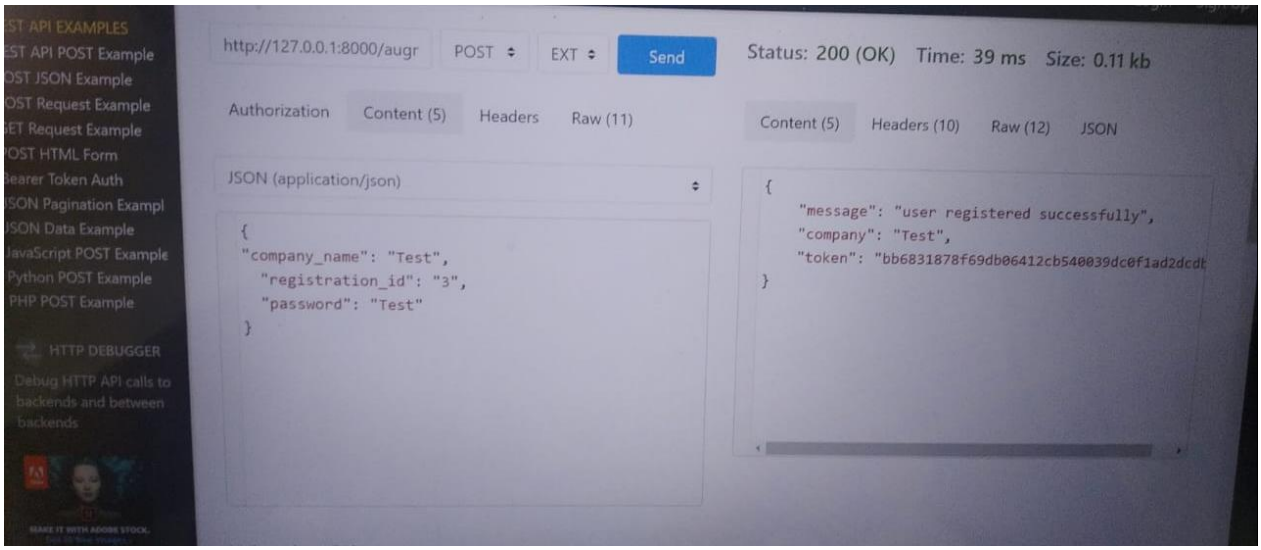

Fig 4

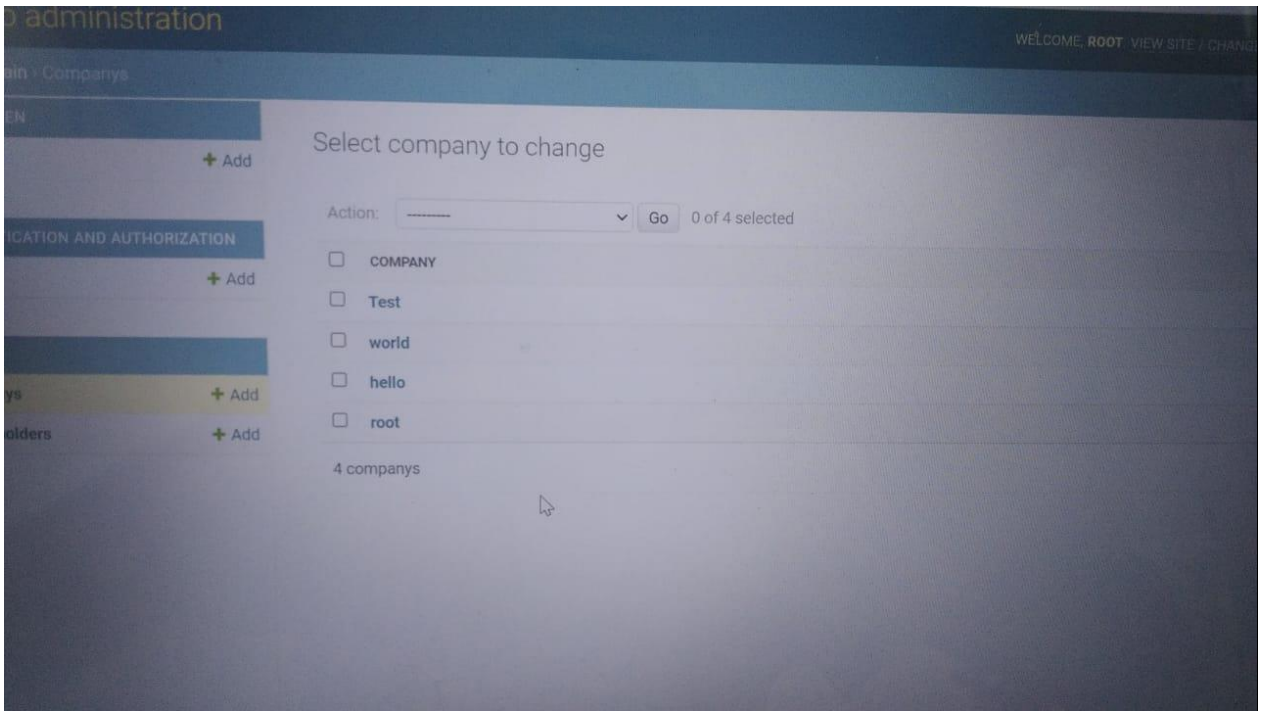
administration
WELCOME, ROOT
Companys
Add
Select company to change
Action:
Go
0 of 4 selected
COMPANY
Test
world
hello
root
4 companys

Fig. 5

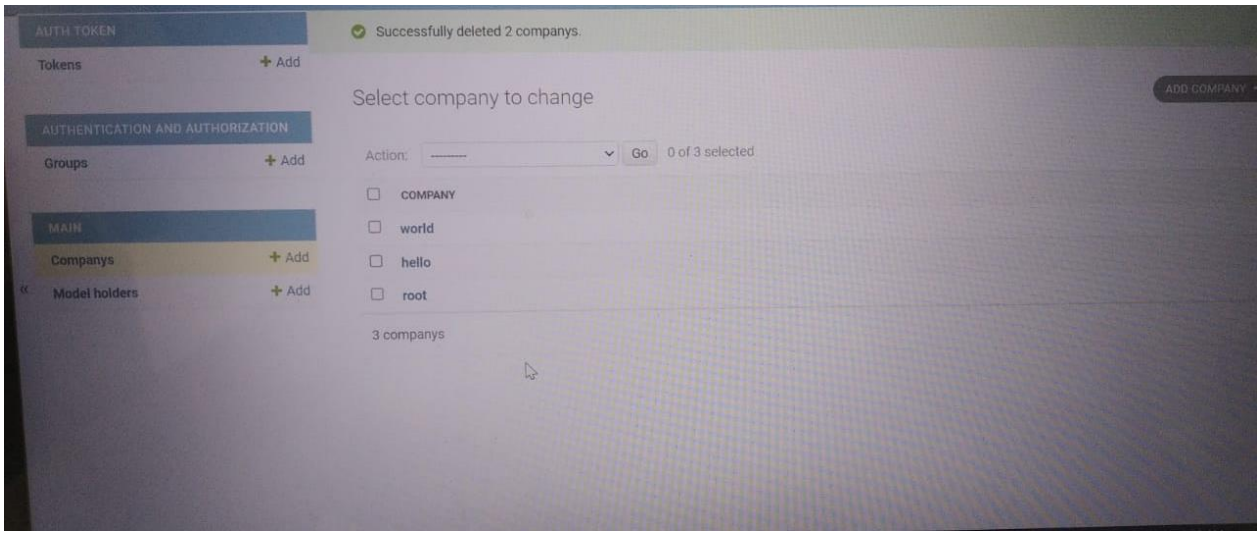
AUTH TOKEN
Tokens
Add
Successfully deleted 2 companys.
Select company to change
AUTHENTICATION AND AUTHORIZATION
Groups
Add
Action:
Go
0 of 3 selected
COMPANY
MAIN
world
Companys
Add
hello
Model holders
Add
root
3 companys

Fig. 6

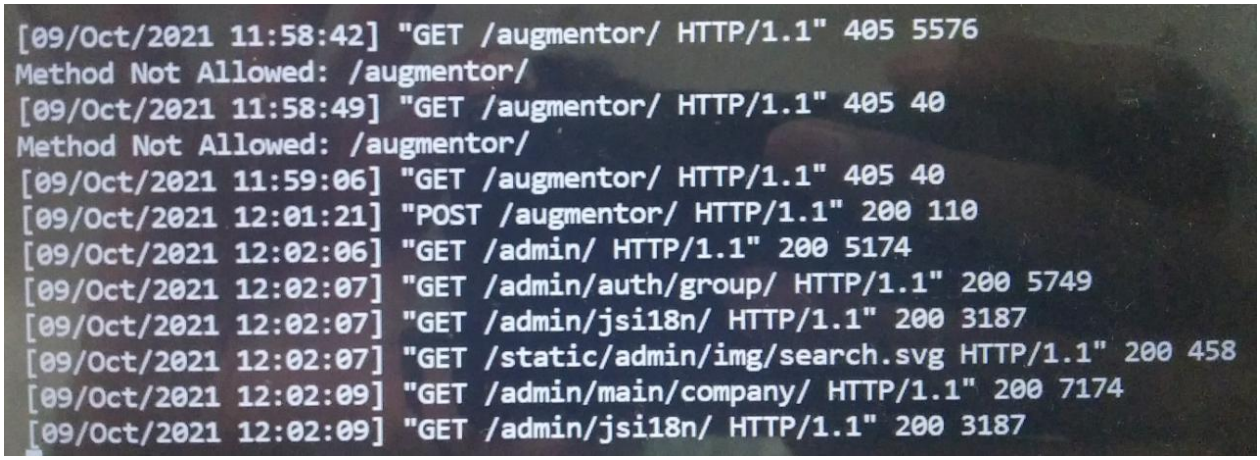
[09/Oct/2021 11:58:42] "GET /augmentor/ HTTP/1.1" 405 5576
Method Not Allowed: /augmentor/
[09/Oct/2021 11:58:49] "GET /augmentor/ HTTP/1.1" 405 40
Method Not Allowed: /augmentor/
[09/Oct/2021 11:59:06] "GET /augmentor/ HTTP/1.1" 405 40
[09/Oct/2021 12:01:21] "POST /augmentor/ HTTP/1.1" 200 110
[09/Oct/2021 12:02:06] "GET /admin/ HTTP/1.1" 200 5174
[09/Oct/2021 12:02:07] "GET /admin/auth/group/ HTTP/1.1" 200 5749
[09/Oct/2021 12:02:07] "GET /admin/jsi18n/ HTTP/1.1" 200 3187
[09/Oct/2021 12:02:07] "GET /static/admin/img/search.svg HTTP/1.1" 200 458
[09/Oct/2021 12:02:09] "GET /admin/main/company/ HTTP/1.1" 200 7174
[09/Oct/2021 12:02:09] "GET /admin/jsi18n/ HTTP/1.1" 200 3187

Fig 7

Chapter – Seven

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