

## Vehicle Management Systems using Sales Force

### 1. INTRODUCTION

#### 1.1 Overview

Vehicle Management Systems (VMS) have become important over time in space, due to Vehicle Management Systems (VMS) have become increasingly important over time in space missions, due both to the demands for increased flexibility and capability of these missions, and the supply of increasingly capable computing systems to provide this improved functionality. VMSs include the management of uncertainties in vehicle state, which is the vehicle portion of System Health Management (SHM), and the management and control of vehicle components to achieve external goals, which we will term "System Operations Management" (SOM). SHM and SOM functions can be allocated to humans or machines, whether on the ground or on-board. To the extent these are allocated to the vehicle's machines (as opposed to crew), these are part of the Vehicle Management System. The increasing complexity of the tasks that space systems are asked to accomplish, and the software and operational procedures necessary to accomplish them, have made VMSs a necessity for exploration missions. This paper investigates the underlying needs and functionality of Vehicle Management Systems, so as to better understand, and ultimately to better design them. To do this, we shall draw upon ideas from information theory and system health management theory. Since VMSs necessarily use information to manage complex systems, information theory provide important insights. System Health Management theory has evolved to handle internal uncertainties, and we extend its ideas to deal with external uncertainties with Systems Operations Management (SHM), and the management and control of Vehicle Management System is software which is helpful for bus operators, who wants to operate many bus trips in a day. Vehicle Management System is a windows application written for 32-bit Windows operating systems which focused in the area of adding, editing and deleting the passengers, staff and the bus routes.

In this software a person can be register as a user and he can manage the bus routes and the staff, passengers' details. He can add a bus and its details including bus route details. User can also add the details of the staff and their duty time in the system.

Vehicle Management System is software which is helpful for bus operators, who wants to operate many bus trips in a day. Vehicle Management System is a windows application written for 32-bit Windows operating systems which focused in the area of adding, editing and deleting the passengers, staff and the bus routes.

In this software a person can be register as a user and he can manage the bus routes and the staff, passengers' details. He can add a bus and its details including bus route details. User can also add the details of the staff and their duty time in the system.

A vehicle management system is a software system – or platform – that serves to manage commercial fleets of vehicles, such as cars, vans or trucks – or even heavy equipment – to ensure they're utilized safely, efficiently and professionally, while making sure they're well and high performing.

Vehicle Management is on application where a customer details are stored inorder to choose cars, bikes and commercial vehicles for travel with in the city the data which is stored here is further used to remind them if any offers are provided during the seasons and any updates regarding vehicles are sent to them in the form of messages and mails.

## 1.2 Purpose

Improve fleet safety, and working conditions

Improve the behavior and performance of drivers and beat and unsafe driving

Schedule shifts and work hours

Leverage driver retention

Track vehicles, assets or professional equipment (even trailers and containers)

Schedule routine maintenance

Manage fuel efficiency

Keep tracks of malfunctions

Track mileage and manage deductible

Produce individualized report for all parties involved

A Vehicle Management system can prove useful to nearly any business that uses a fleet. This includes but is not limited to:

Contractors

Delivery fleets (last mile delivery)

Taxis, Limos and VIP Vehicles

Facility trucks

Shipping containers/maritime transport

Heavy duty vehicle and mining equipment

Moving trucks

Hearses

Grey or white fleets

Rental/Leased vehicles

School buses

Private vehicle

Backhauling fleets

All light duty vehicles

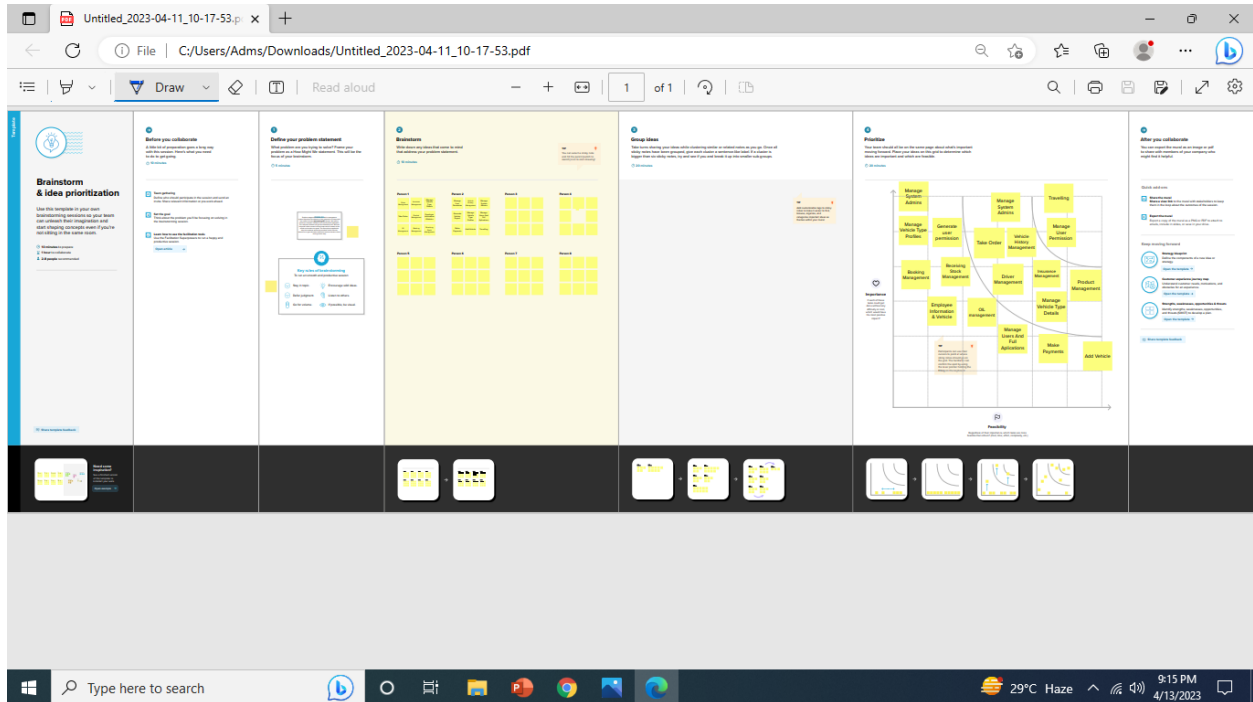
Supply chain vehicles

## 2 PROBLEM DEFINITION AND DESIGN THINKING

### 2.1 Empathy Map

The screenshot displays a Mural collaborative workspace. The top navigation bar includes the Mural logo and a tab titled 'Untitled mural • Vehicle manage'. The address bar shows the URL: [app.mural.co/t/salesforce4696/m/salesforce4696/1681273131373/f3211dc2de04167523ddda46699e1d6048474fdd?sender=uc95b3c0ca7241537bcda4610](https://app.mural.co/t/salesforce4696/m/salesforce4696/1681273131373/f3211dc2de04167523ddda46699e1d6048474fdd?sender=uc95b3c0ca7241537bcda4610). A red banner at the top of the workspace states: 'You've reached the maximum number of murals. Upgrade your free plan for unlimited murals. Upgrade'. The main workspace area features a sidebar on the left with drawing tools (eraser, highlighter, text, shapes, etc.) and a central canvas titled 'Empathy map'. The canvas contains a grid of sticky notes with text such as 'It can help you to attract top innovation', 'It can help you to build a strong brand', 'Professional and friendly approachable staff', 'Safety and security of the electric vehicle', 'Well maintained facilities and equipment', 'Designing for today's sophisticated needs', 'Providing excellent driving experience', 'Well connected to all important roads', and 'It can be a key source of long term success'. The bottom of the screen shows a Windows taskbar with the search bar, task view button, and several application icons (Edge, File Explorer, PowerPoint, etc.). The system tray on the right indicates the date and time: '9:25 PM 4/13/2023'.

## 2.2 Brain Storming



## 3 RESULT

### 3.1 Data Model:

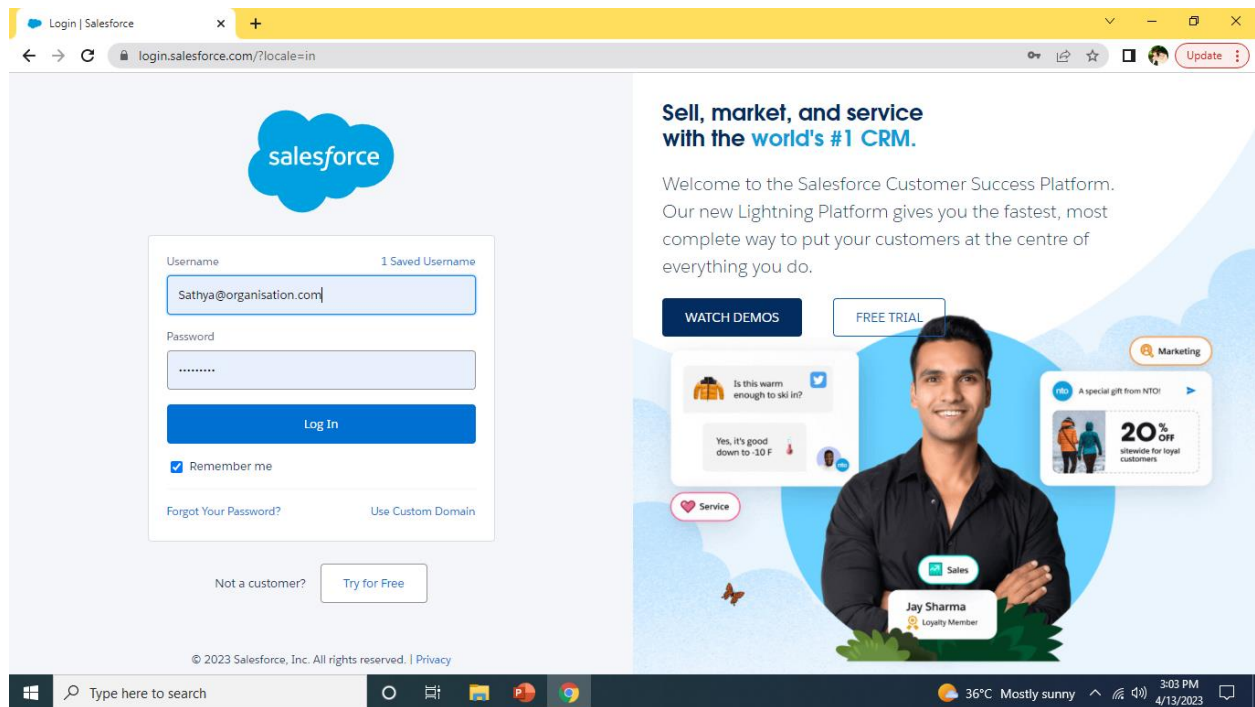
Object Name	Field in the Object	
Vehicles	Field Label	Data Type
	2 Wheelers	Picklist
	4 Wheelers	Picklist
	Body Type	Text(18)
	Chassic no	Text(18)
	Colour	Text(18)
	Condition	Picklist
	Created by	Lookup(user)
	Customer Name	Text(12)
	Customer Mobile no	Number(18,0)
	Owner	Lookup(user,group)
	Seats	Number(18,0)

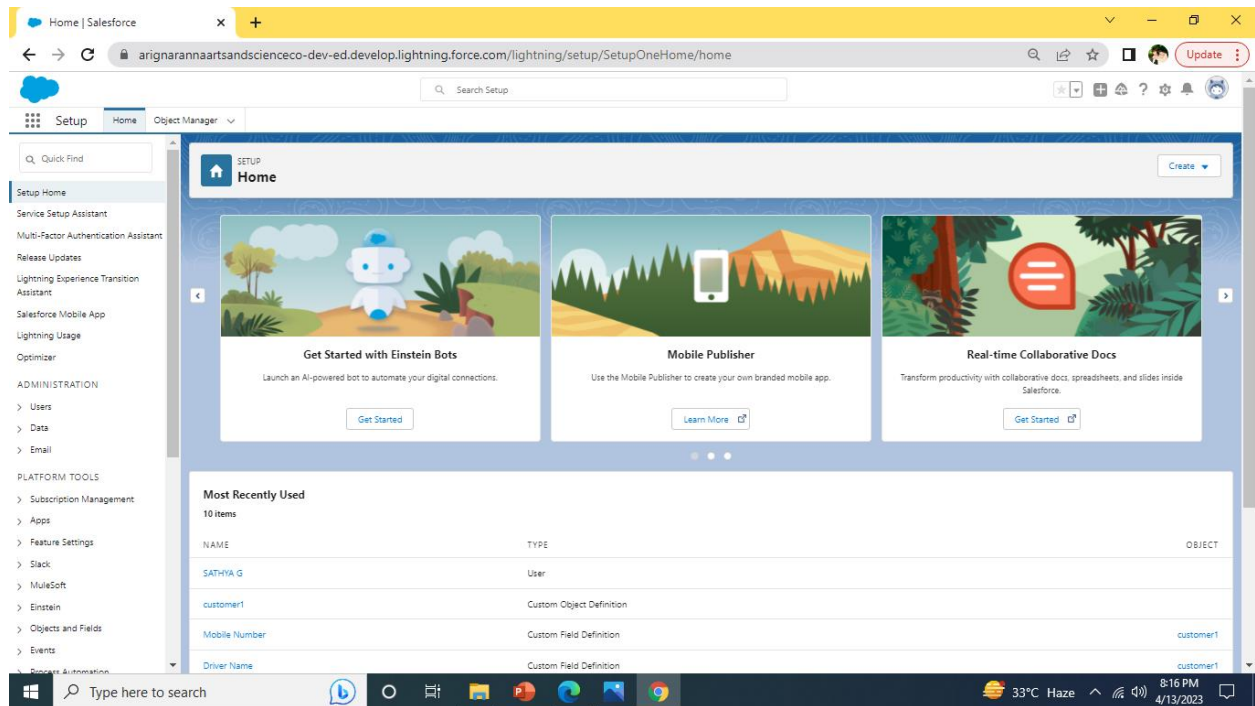
	Start Date	Date/Time
	Vehicle	Number(10,0)(external ID)(Unique)
	Vehicle Name	Text(18)
	Vehicle Name	Text(80)
	Vehicle no	Text(18)
	Vehicle types	Picklist
	Vehicle includes	Picklist(Multi select)
	Mileage	Text(18)
	End Date	Date/Time
	Opportunity	Lookup(opportunity)
	Last modified by	Lookup(user)
	Driver Name	Text(18)
Driver		
	Field Lable	Date Type
	Created by	Lookup(user)
	Driver Name	Text(20)
	Last modified by	Lookup(user)
	Fair per hour	Text(18)
	Licence no	Text(18)
	Mobile no	Number(18,0)
	Driver Name	Text(80)
	Owner	Lookup(user,group)
	Vehicle	Lookup(Vehicle)

### 3.2 Activity and Screenshots

Milestone 1: Creation salesforce org:

Activity 1: Creating Developer Account





## Milestone 2: Object

Activity 1: To create an object(Vehicle or Custom object)

vehicle | Salesforce

arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/lightning/setup/ObjectManager/0112w000003Hacy/Details/view

Search Setup

Setup Home Object Manager

SETUP > OBJECT MANAGER  
vehicle

**Details**

Fields & Relationships  
Page Layouts  
Lightning Record Pages  
Buttons, Links, and Actions  
Compact Layouts  
Field Sets  
Object Limits  
Record Types  
Related Lookup Filters  
Search Layouts  
List View Button Layout

**Details**

Description

API Name  
vehicle\_\_c

Custom

Singular Label  
vehicle

Plural Label  
vehicle

Enable Reports  
✓

Track Activities

Track Field History

Deployment Status  
Deployed

Help Settings  
Standard salesforce.com Help Window

Edit Delete

Type here to search

39°C Partly sunny 7:03 PM 4/19/2023

Activity 2: To create an object(Driver object)

Driver | Salesforce

arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/lightning/setup/ObjectManager/0112w000003Had3/Details/view

Search Setup

Setup Home Object Manager

SETUP > OBJECT MANAGER  
Driver

**Details**

Fields & Relationships  
Page Layouts  
Lightning Record Pages  
Buttons, Links, and Actions  
Compact Layouts  
Field Sets  
Object Limits  
Record Types  
Related Lookup Filters  
Search Layouts  
List View Button Layout

**Details**

Description

API Name  
Driver\_\_c

Custom

Singular Label  
Driver

Plural Label  
Driver

Enable Reports  
✓

Track Activities

Track Field History

Deployment Status  
Deployed

Help Settings  
Standard salesforce.com Help Window

Edit Delete

Type here to search

39°C Partly sunny 7:04 PM 4/19/2023



## Milestone 3 : Field and Relationship

### Activity 1: Creation of fields (vehicle object data type)

This screenshot shows the Salesforce Setup interface for the 'vehicle' object. The 'Fields & Relationships' section is active, displaying a table of fields. The table has five columns: FIELD LABEL, FIELD NAME, DATA TYPE, CONTROLLING FIELD, and INDEXED. There are four items listed, sorted by Field Label. The fields are: Created By (CreatedById, Lookup(User)), Last Modified By (LastModifiedById, Lookup(User)), Owner (Ownerid, Lookup(User,Group)), and vehicle Name (Name, Text(80)). The 'vehicle Name' field is highlighted with a blue background.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	Ownerid	Lookup(User,Group)		✓
vehicle Name	Name	Text(80)		✓

This screenshot shows the Salesforce Setup interface for the 'vehicle' object. The 'Fields & Relationships' section is active, displaying a table of fields. The table has five columns: FIELD LABEL, FIELD NAME, DATA TYPE, CONTROLLING FIELD, and INDEXED. There are four items listed, sorted by Field Label. The fields are: Created By (CreatedById, Lookup(User)), Last Modified By (LastModifiedById, Lookup(User)), Owner (Ownerid, Lookup(User,Group)), and vehicle Name (Name, Text(80)). The 'vehicle Name' field is highlighted with a blue background.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	Ownerid	Lookup(User,Group)		✓
vehicle Name	Name	Text(80)		✓

vehicle | Salesforce

arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/lightning/setup/ObjectManager/0112w000003Hacy/FieldsAndRelationships/view

Search Setup

SetupHomeObject Manager

SETUP > OBJECT MANAGER

vehicle

Details

Fields & Relationships

Page Layouts

Lightning Record Pages

Buttons, Links, and Actions

Compact Layouts

Field Sets

Object Limits

Record Types

Related Lookup Filters

Search Layouts

List View Button Layout

Fields & Relationships

4 Items, Sorted by Field Label

Quick Find

NewDeleted FieldsField DependenciesSet History Tracking

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓
vehicle Name	Name	Text(80)		✓

Type here to search

39°C Partly sunny7:04 PM4/19/2023

## Activity 2: To create driver object(Driver object data type)

The screenshot shows the Salesforce Setup interface for the 'Driver' object. The left sidebar contains navigation links: Details, Fields & Relationships (selected), Page Layouts, Lightning Record Pages, Buttons, Links, and Actions, Compact Layouts, Field Sets, Object Limits, Record Types, Related Lookup Filters, and Search Layouts. The main content area is titled 'Fields & Relationships' and shows a table of 4 items. The table has columns: FIELD LABEL, FIELD NAME, DATA TYPE, CONTROLLING FIELD, and INDEXED. The items are: 'Created By' (CreatedBy, Lookup(User)), 'Driver Name' (Name, Text(80)), 'Last Modified By' (LastModifiedBy, Lookup(User)), and 'Owner' (OwnerId, Lookup(User,Group)).

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedBy	Lookup(User)		
Driver Name	Name	Text(80)		✓
Last Modified By	LastModifiedBy	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓

## Activity 3: Fields in driver object

The screenshot shows the Salesforce Setup interface for the 'vehicle' object, specifically the 'New Field Dependency' page. The left sidebar contains navigation links: Details, Fields & Relationships (selected), Page Layouts, Lightning Record Pages, Buttons, Links, and Actions, Compact Layouts, Field Sets, Object Limits, Record Types, Related Lookup Filters, and Search Layouts. The main content area is titled 'New Field Dependency' and contains instructions on how to create a dependent relationship. It includes two steps: Step 1 (Select a controlling field and a dependent field) and Step 2 (Edit the filter rules). Below the instructions is a form with two dropdown menus: 'Controlling Field' and 'Dependent Field', both currently set to '--None--'. There are 'Continue' and 'Cancel' buttons next to each dropdown.

**New Field Dependency**

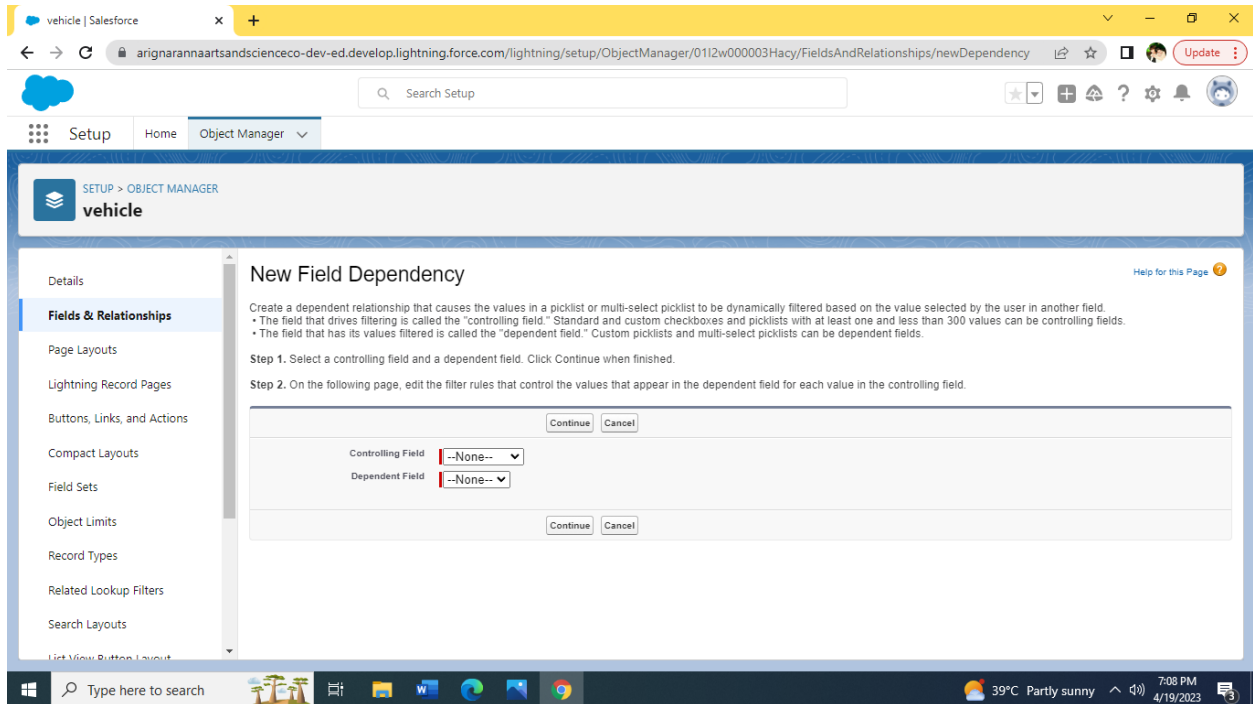
Create a dependent relationship that causes the values in a picklist or multi-select picklist to be dynamically filtered based on the value selected by the user in another field.

- The field that drives filtering is called the "controlling field." Standard and custom checkboxes and picklists with at least one and less than 300 values can be controlling fields.
- The field that has its values filtered is called the "dependent field." Custom picklists and multi-select picklists can be dependent fields.

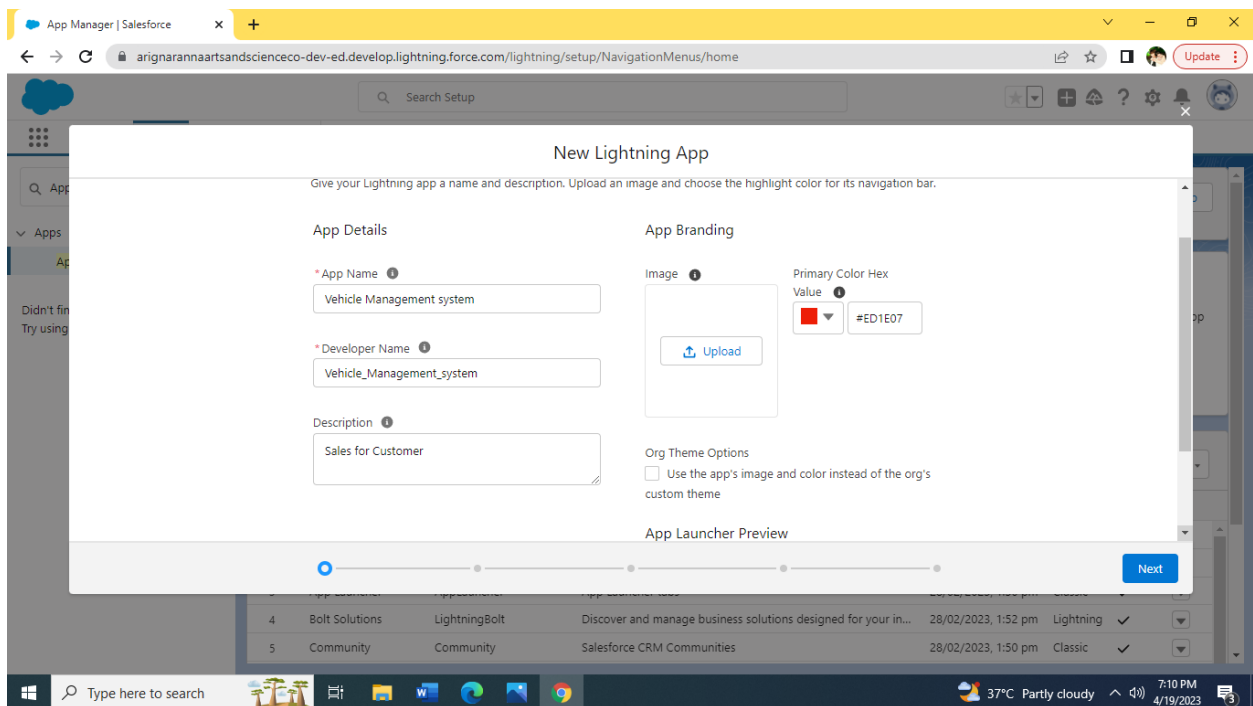
**Step 1.** Select a controlling field and a dependent field. Click Continue when finished.

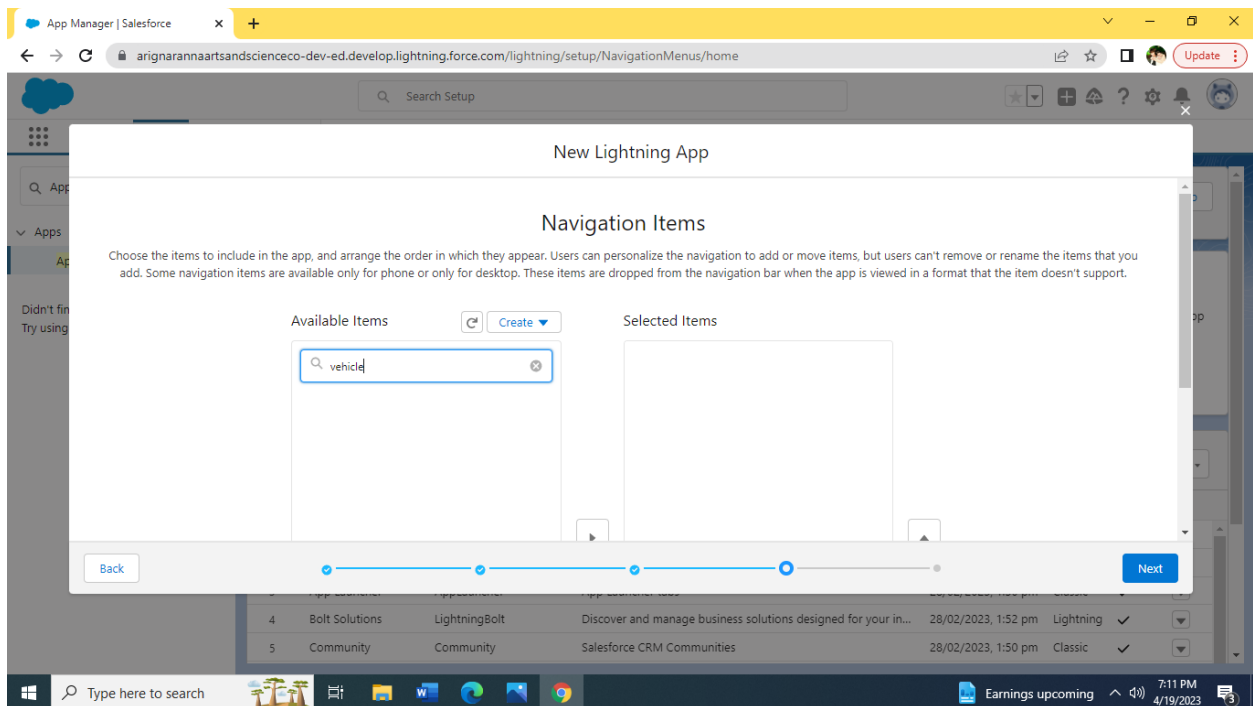
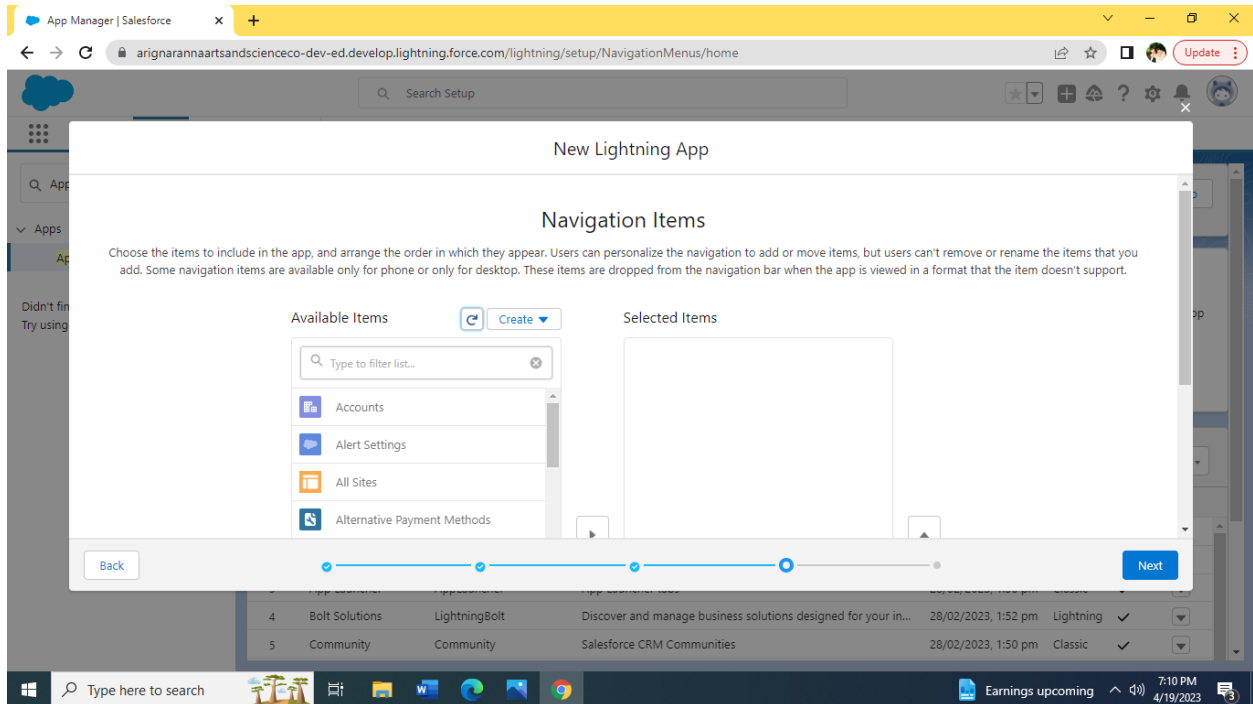
**Step 2.** On the following page, edit the filter rules that control the values that appear in the dependent field for each value in the controlling field.

Controlling Field: --None--  
Dependent Field: --None--



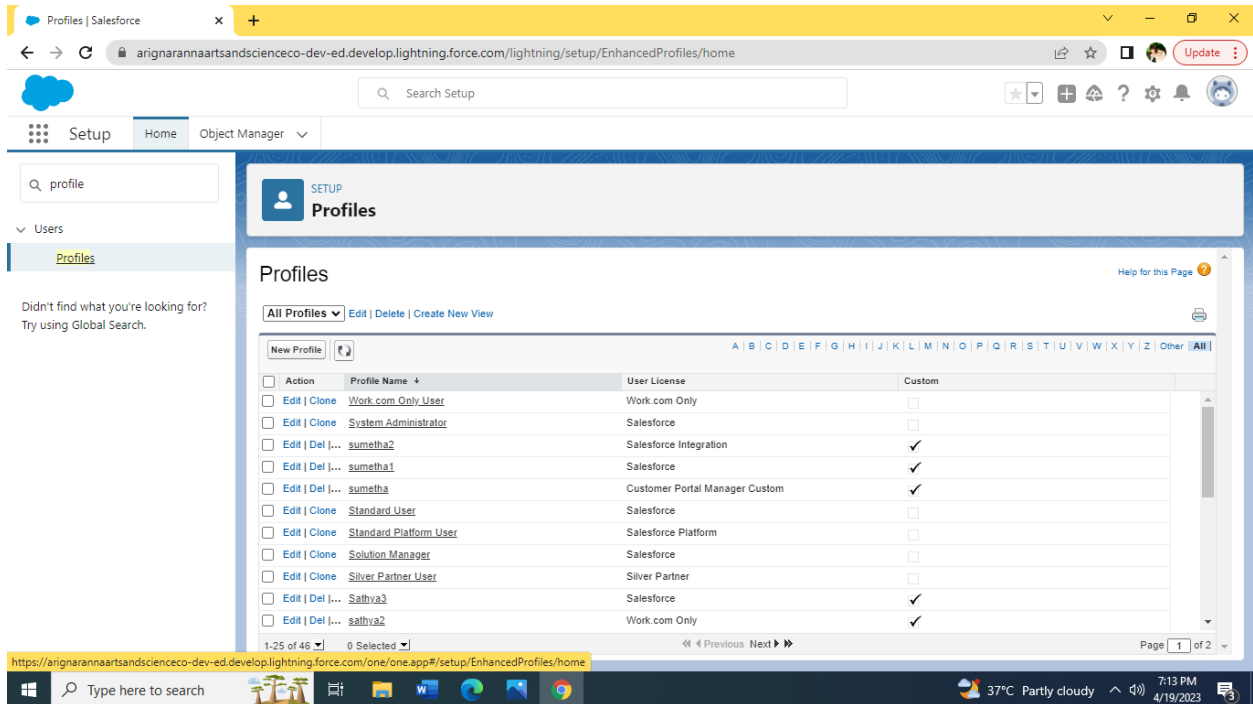
## Milestone 4: Lightning App





## Milestone 5: Profile

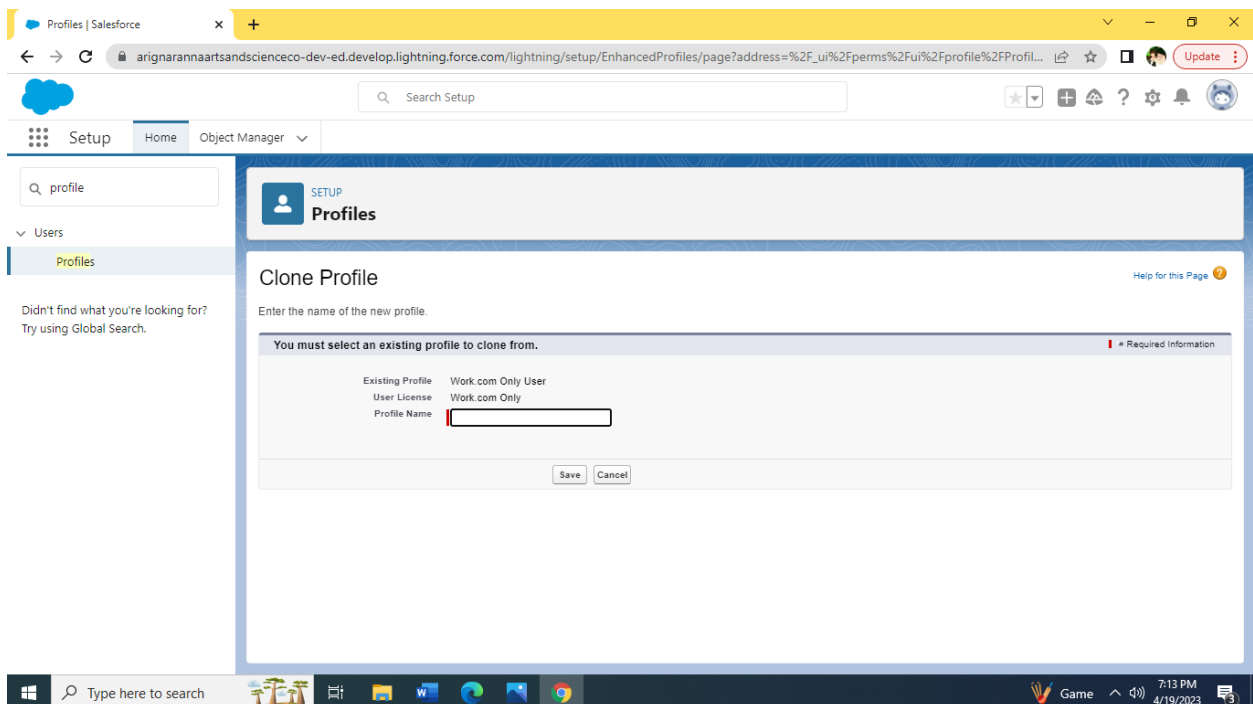
### Activity 1: Creating a profiles



The screenshot shows the Salesforce Setup interface for Profiles. The left sidebar contains a search bar with "profile" and a list of navigation items: Users, Profiles, and a message "Didn't find what you're looking for? Try using Global Search." The main content area is titled "Profiles" and includes a "New Profile" button and a table of existing profiles.

Action	Profile Name	User License	Custom
<input type="checkbox"/> Edit   Clone	Work.com Only User	Work.com Only	<input type="checkbox"/>
<input type="checkbox"/> Edit   Clone	System Administrator	Salesforce	<input type="checkbox"/>
<input type="checkbox"/> Edit   Del   ...	sumetha2	Salesforce Integration	<input checked="" type="checkbox"/>
<input type="checkbox"/> Edit   Del   ...	sumetha1	Salesforce	<input checked="" type="checkbox"/>
<input type="checkbox"/> Edit   Del   ...	sumetha	Customer Portal Manager Custom	<input checked="" type="checkbox"/>
<input type="checkbox"/> Edit   Clone	Standard User	Salesforce	<input type="checkbox"/>
<input type="checkbox"/> Edit   Clone	Standard Platform User	Salesforce Platform	<input type="checkbox"/>
<input type="checkbox"/> Edit   Clone	Solution Manager	Salesforce	<input type="checkbox"/>
<input type="checkbox"/> Edit   Clone	Silver Partner User	Silver Partner	<input type="checkbox"/>
<input type="checkbox"/> Edit   Del   ...	Salthva3	Salesforce	<input checked="" type="checkbox"/>
<input type="checkbox"/> Edit   Del   ...	Salthva2	Work.com Only	<input checked="" type="checkbox"/>

1-25 of 46 | 0 Selected | Previous Next | Page 1 of 2

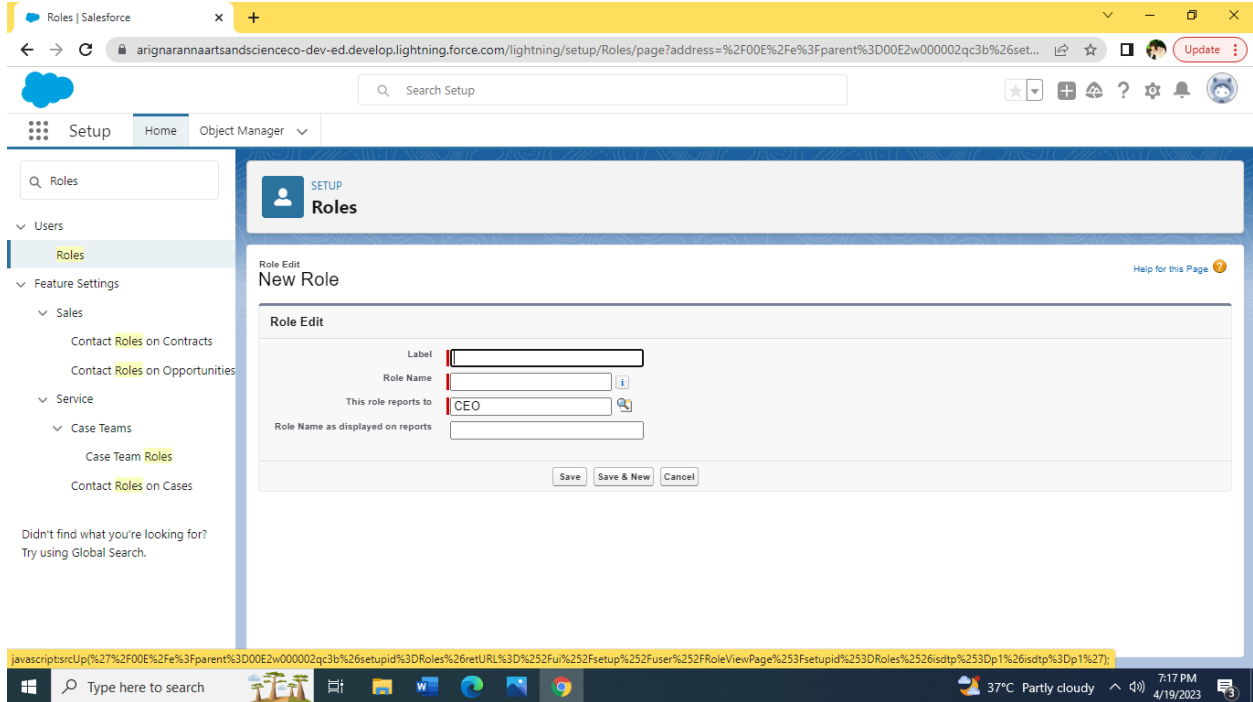


The screenshot shows the "Clone Profile" dialog in the Salesforce Setup interface. The dialog prompts the user to "Enter the name of the new profile." and displays a table of existing profiles to select from.

Existing Profile	User License	Profile Name
Work.com Only User	Work.com Only	<input type="text"/>

Buttons: Save Cancel

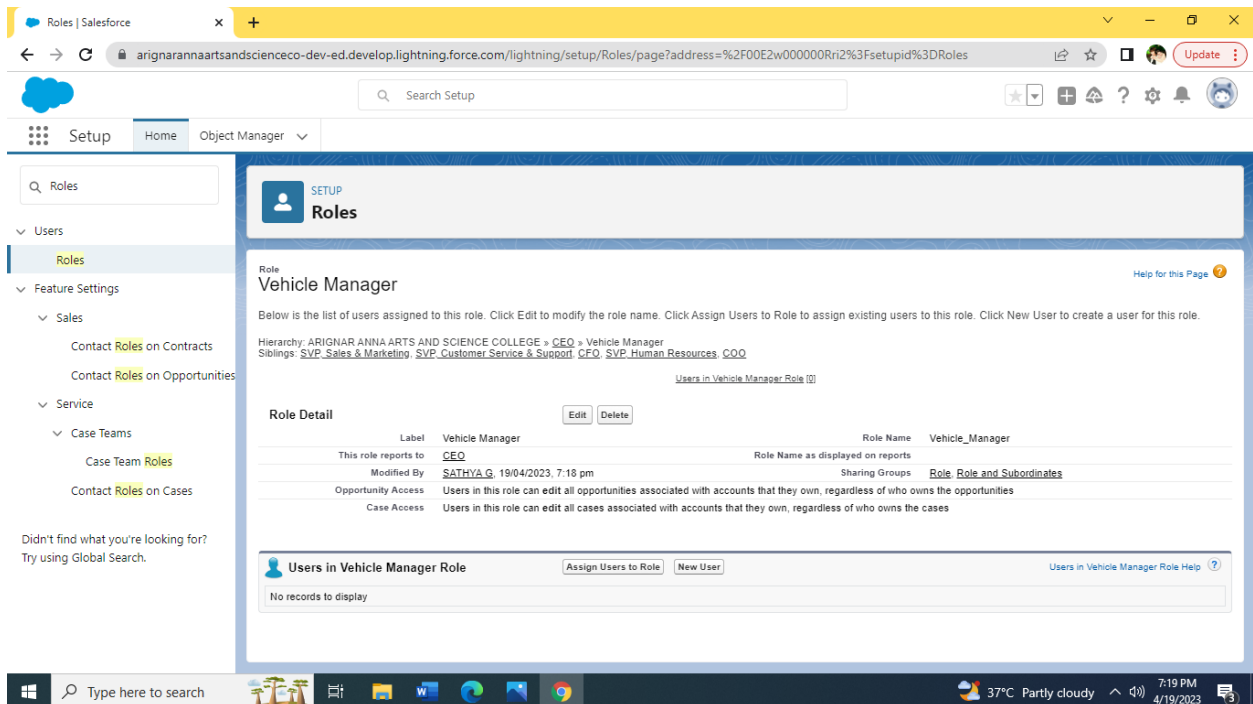
## Setup roles



This screenshot shows the 'New Role' form in the Salesforce Setup interface. The left sidebar contains navigation links for Roles, Users, Feature Settings, Sales, Service, and Case Teams. The main content area is titled 'New Role' and includes a 'Role Edit' section with the following fields:

- Label:
- Role Name:
- This role reports to:
- Role Name as displayed on reports:

At the bottom of the form are buttons for 'Save', 'Save & New', and 'Cancel'. The browser's address bar shows the URL: `arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/lightning/setup/Roles/page?address=%2F00E2w000002qc3b%26set...`. The taskbar at the bottom shows the date as 4/19/2023 and the time as 7:17 PM.



This screenshot shows the 'Vehicle Manager' role details in the Salesforce Setup interface. The left sidebar is the same as the previous screenshot. The main content area is titled 'Vehicle Manager' and includes the following information:

- Role Detail:** A table showing the role's configuration.
- Users in Vehicle Manager Role:** A section with buttons for 'Assign Users to Role' and 'New User'.

Label	Vehicle Manager	Role Name	Vehicle_Manager
This role reports to	CEO	Role Name as displayed on reports	
Modified By	SATHYA G, 19/04/2023, 7:18 pm	Sharing Groups	Role, Role and Subordinates
Opportunity Access	Users in this role can edit all opportunities associated with accounts that they own, regardless of who owns the opportunities		
Case Access	Users in this role can edit all cases associated with accounts that they own, regardless of who owns the cases		

The 'Users in Vehicle Manager Role' section shows 'No records to display'. The browser's address bar shows the URL: `arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/lightning/setup/Roles/page?address=%2F00E2w000000Ri2%3Fsetupid%3DRoles`. The taskbar at the bottom shows the date as 4/19/2023 and the time as 7:19 PM.

## Milestone 6: Users

### Activity 1: Creating a users

The screenshot shows the Salesforce Setup interface for managing users. The left sidebar contains navigation options: Users, Permission Set Groups, Permission Sets, Profiles, Public Groups, Queues, Roles, User Management Settings, Feature Settings, Data.com, and Prospector Users. The main content area is titled 'User Edit SATHYA G' and includes a 'General Information' section with fields for First Name, Last Name, Alias, Email, Username, Nickname, Title, Company, Department, and Division. The 'Role' is set to '<None Specified>' and the 'User License' is 'Salesforce'. The 'Profile' is 'System Administrator'. The 'Active' checkbox is checked. The 'Marketing User' checkbox is checked. The 'Offline User' checkbox is checked. The 'Knowledge User' checkbox is unchecked. The 'Flow User' checkbox is unchecked. The 'Service Cloud User' checkbox is checked. The 'Site.com Contributor User' checkbox is unchecked. The 'Site.com Publisher User' checkbox is unchecked. The 'WDC User' checkbox is unchecked. The 'Save' button is visible.

javascriptsrcUp(%27%2F0052w00000EnOZ2%3Fisdtp%3Dp1%26isUserEntityOver...

The screenshot shows the Salesforce Setup interface for managing users. The left sidebar contains navigation options: Users, Permission Set Groups, Permission Sets, Profiles, Public Groups, Queues, Roles, User Management Settings, Feature Settings, Data.com, and Prospector Users. The main content area is titled 'All Users' and includes a table of users. The table has columns for Action, Full Name, Alias, Username, Role, Active, and Profile. The table contains the following data:

Action	Full Name	Alias	Username	Role	Active	Profile
<a href="#">Edit</a>	Chatter Expert	Chatter	chatty.00d2w00000r1to8ead.gyu4zo8cuw0a@chatter.salesforce.com		✓	Chatter Free User
<a href="#">Edit</a>	G. SATHYA	SG	sathya@organisation.com		✓	System Administrator
<a href="#">Edit</a>	G. sathya	sg	sathyaaprathina20@gmail.com	VP_Marketing	✓	Contract Manager
<a href="#">Edit</a>	User Integration	integ	integration@00d2w00000r1to8ead.com		✓	Analytics Cloud Integration User
<a href="#">Edit</a>	User Security	sec	insightssecurity@00d2w00000r1to8ead.com		✓	Analytics Cloud Security User

https://arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/one/app#/setup/ManageUsers/home



## Milestone 7: Reports

### Activity 1: Reports and Dashboards

The screenshot shows the Salesforce Report Builder interface. The browser address bar displays a URL from a development environment. The top navigation bar includes tabs for Sales, Home, Opportunities, Leads, Tasks, Files, Accounts, Contacts, Campaigns, Dashboards, Reports, Chatter, Groups, and More. The 'Reports' tab is active, showing a report titled 'New Accounts Report' under the 'Accounts' data source. The report is in preview mode, displaying a message: 'No records returned. Try editing report filters:'. Below this message, three suggestions are provided: 'Show All accounts', 'Set the Created Date filter to All Time', and 'Edit other filters in the filter panel'. The left sidebar contains an 'Outline' panel with 'Groups' and 'Columns' sections. The 'Columns' section lists various fields: Last Activity, Account Owner, Account Name, Billing State/Province, Type, Rating, and Last Modified Date. The bottom of the screen shows a Windows taskbar with a search bar and several application icons, including a weather widget indicating 37°C and a date of 4/19/2023.

This is a duplicate of the screenshot above, showing the same Salesforce Report Builder interface. It displays the 'New Accounts Report' with no records returned and provides the same suggestions for editing filters. The interface elements, including the navigation bar, sidebar, and Windows taskbar, are identical to the first screenshot.

Report Builder | Salesforce

arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/one.app#eyJjb21wb25lbnREZWYiOiJyZXBycnRzOnJlcG9ydEJ1aWxkZXIiLCJhdHRyaWJ1dG...

Search...

Sales Home Opportunities Leads Tasks Files Accounts Contacts Campaigns Dashboards Reports Chatter Groups More

REPORT ▼

New Accounts Report Accounts

Outline Filters 2

Previewing a limited number of records. Run the report to see everything. Update Preview Automatically

Last Activity Account Owner Account Name Billing State/Province Type Rating Last Modified Date

No records returned. Try editing report filters:

- Show All accounts.
- Set the Created Date filter to All Time.
- Edit other filters in the filter panel.

Groups

GROUP ROWS

Add group...

Columns

Add column...

Last Activity X

Account Owner X

Account Name X

Billing State/Province X

Type X

Rating X

Last Modified Date X

To Do List

Type here to search

37°C Partly cloudy 7:22 PM 4/19/2023

## Activity 2: Dashboard

Reports | Salesforce

arignarannaartsandscienceco-dev-ed.develop.lightning.force.com/lightning/o/Report/home?queryScope=mr...

Search...

Sales Home Opportunities Leads Tasks Files Accounts Contacts Campaigns Dashboards Reports Chatter Groups More

Reports

Recent

1 item

Search recent reports...

New Report New Folder

REPORTS	Report Name	Description	Folder	Created By	Created On	Subscribed
Recent	New Accounts Report		Private Reports	SATHYA G	13/4/2023, 2:57 pm	

Created by Me

Private Reports

Public Reports

All Reports

FOLDERS

All Folders

Created by Me

Shared with Me

FAVORITES

All Favorites

To Do List

Type here to search

37°C Partly cloudy 7:23 PM 4/19/2023

## 2 TRAILHEAD PROFILE PUBLIC URL

Team lead -<https://trailblazer.me/id/Sathya7814>

Team member 1 -<https://trailblazer.me/id/Sumek4>

## 5 ADVANTAGES AND DISADVANTAGES

### List of Advantages

- Good for long drives.
  - Personal vehicle meaning it's upto you where and when you want to go.
  - Cars are very useful for all kinds of commutes ranging from short distance commutes to long drives.
  - Car are very comfortable to travel in.
  - Car can be used in all kinds of weather ranging from rain to snow
  - Prevention of car crashes. Of the 37,133 vehicle fatalities in 2017,94% of the crashes were due to human error....
  - Societal cost-savings.
  - Traffic efficiency.
  - Better access and mode of transportation .
  - Environmentally friendly
  - People can have complete freedom of choice in the process and roads to get to their destination.
  - User have a much safer privacy compared to using public transportation.
  - Maintenance is cheaper when compared to a car.
  - Easier to find parking spot and requires almost no money for parking.
  - Good for daily commutes and for long rides.
- ### List of Disadvantages
- Not good for Rainy days
  - Chances of death are higher.
  - If some part gets broken it can lead to an accident.
  - Easier to get stolen.

- Takes too much space causing traffic jams.
- Parking is costly and is quite difficult to find a good spot.
- Regular Maintenance.
- Fear of getting your car scratched or denoted by another irresponsible person.
- Owning a car is expensive and requires extra maintenance.
- Cars are costly to purchase and are not a viable option for lower – income households.
- Cars are expensive to maintain and requires frequent services.
- Cars are a major source of environmental pollution.
- More fuels is being used as more cars are being used by people, leading to other generation facing a shortage of this fuel

## 6 APPLICATIONS

VMS is concerned with managing the total vehicle state in response to both external environment and internal system conditions. This requires the vehicle state to be represented within the VMS to form a basis of decisions to maintain human life and mission objectives. Interestingly, it also requires an estimate of external state, at least to the degree necessary for the vehicle to interact with it. Information theory provides the basic definitions to determine the information necessary to represent the total vehicle and external state. The goal is to reduce the uncertainty (entropy) of this state estimate to provide for efficient and accurate solutions. For the purposes of this analysis, we will focus only on the vehicle state, though the calculation of the external state would be similar.

The Data Processing Inequality [3] indicates that communication paths and processing nodes should be minimized and is given by:  $H(V) \geq H(V:C) \geq H(V:Y)$  where  $C :=$  State after communication  $Y :=$  Final output state after processing. This forms a Markov Chain which shows the information content is reduced (uncertainty increases) with each communication and processing path. This is due to uncertainty being added due to noise, interference, and error (environment induced, coding errors, electrical failures, etc).

Lost information is in the form of bit flips or lost bits ( $b = e \neq 0,1$ ) due to noise. The Error Entropy  $H(p_e)$  can be calculated based on the probability of error occurrence. [3] The Error Entropy grows with the Vehicle State space:  $H(p) = -p \log(V-1) - (1-p) \log(V)$ . The entropy for the VMS System Management Loop can be calculated as:  $H(S) \geq H(S:C2) \geq H(S:P) \geq H(S:D) \geq H(S) \geq H(S:C1) \geq H(S:M)$  where  $S$  is the System state  $M$  is the measured state  $P$  is the calculated performance state  $D$  is the calculated diagnostic state  $Pr$  is the calculated prognostic state  $C1$  is the communicated state from measurement to performance  $C2$  is the final communicated state. This assumes that each state is not conditioning but is determining unique portions of the state information. No communication-induced information entropy has been accounted for between performance, diagnostics, and prognostics (i.e. no entropy between algorithms on the same machine). The inequality above shows that if one ignores the added uncertainties due to added communication paths and data, the certainty of the knowledge about the system state improves, and hence the system entropy decreases with each processing step, as each processing step is intended to collate and make consistent data about the system state.

## 7 CONCLUSION

Vehicle Management Systems are an important and growing facet of space systems, but have received relatively little theoretical attention. As with many other aspects of engineering, VMS's have been developed in practice, with the theory lagging. However, the complexity of these systems, and of the systems they manage, is beginning to tax "cut and try" methodologies.

Space system designers and operators need a theoretical framework to cope with these increasingly sophisticated systems. Both quantitative and qualitative approaches are appropriate to this theoretical task. The complexity of VMSs, which can be estimated by calculating the entropy of vehicle and external states, is a significant issue that needs to be addressed through appropriate architectural design, as well as more typical verification and validation approaches.

This provides insight into appropriate physical decomposition of a VMS. Functional approaches help designers and operators properly decompose VMSs into logical classifications, which greatly aid architectural division, as well as operational decision-making, whether by humans or machines. This paper provides a starting point from which other engineers can expand these ideas to better understand and design these complex and critical systems.

## 8 FUTURE SCOPE

Factors that steer the growth of the e-hailing business industry

Factors that steer the growth of the e-hailing business industry E-hailing is nothing but the booking of cars or any other transportation through your mobile devices. Here are some factors that steer the growth of the e-hailing business industries. Rise of on-demand cab booking service To be honest, without a smartphone and good internet our day will not be fulfilled. Since we are living in the tech world everything is made simple as I mentioned above. We are also able to bring everything to our place itself, even the world.

After the smart phones entered into everyone's life things kept changing. Now we can book a taxi near our home. We don't need to go so far away to bring a taxi or to book one. In the world, there is half the population of Gen Z. They are the maximum number of persons who use to book the taxi through online apps. So the fact is in a few years there will be more percentage of Gen Z peoples only than Gen X and Y. So there will be high growth in the online taxi booking industry

## The startup trend of the on-demand online taxi app transportation service

The on-demand taxi app service provides all features for their user's comfortability. It also provides real-time tracking and user feedback to rate their traveling experience. Thus the people also start to enjoy their comfortable ride without waiting for a long time. And it also provides a 100% safe journey for their customers.

## Rise in Job opportunity

They not only provide comfort to their customers, but they also give options to drivers to work part-time or full time. In the US N number of people are employed as full-time taxi drivers. The report says Uber gives 50,000 jobs a month and the other top taxi apps like Ola, Lyft, etc are also providing job opportunities worldwide.

## The rise in trends of MaaS (Mobility as a service)

People who don't have their own car or people who feel too lazy to drive a car are always preferring online taxi service for their smooth travel without a sweat. The statistics say that your own vehicle goes \$8858 if you run it for 15k miles per year. So people prefer online taxi apps because there is no need for maintenance costs and petrol costs.

There are few low usages of the internet in some countries there which has less usage of online taxi apps. The digital countries have high growth in the use of on-demand online taxi app service.

## The taxi market has been divided

The taxi app has been divided into two types as we all know online and offline taxi booking services. Its survey shows that 65% of people use online taxi booking app services. The on-demand taxi booking app also shows us the estimated cost before booking a ride. It gives more options for customers to choose from different vehicles.

## Major players of the taxi app

We all may well know about the major players of the taxi app business all over the world are Uber, Lyft, Ola and Grab.

Uber – In 2019 the survey shows that the taxi booking app operates in the Middle East is \$3.1 billion. Uber also started many new services for their customers. Still, the leading top fist taxi booking app is Uber.

Lyft– it was launched after Uber and it's cheaper than the uber service. And they also started their service in over 200+ countries. For example, Uber costs \$16 and Lyft costs only \$12.

Ola – Ola launched its taxi service in 2010 and it claims 1,50,000 booking per day.

Grab – Grab is also one of the famous taxi apps among the US in 65 cities and has 50,000 taxis on the ride. They provide three options for their customers “Ride now”, “Pair and share” and “Ride later”.

The working process of all these on-demand online taxi booking app services is the same. There is no difference in it.