1.1 Company profile:-

TCS is a global leader in IT services, digital and business solutions that partners with its client to simplify , strengthen and transform their business.

TCS ensures highest levels of certainty and satisfaction through a deep-set commitment to the clients,

comprehensive industry expertise and a global network of innovation and delivery centers.

TCS has been recognized by Brand Finance as one of the BIG 4 Global IT Services Brands.

Its continued industry-leading growth is a testament to the certainty their clients experience everyday.

Customer-centric Engagement Model:

-We build our teams around your domain and technology requirements, offering specialized services and solutions that meet the distinct needs of your business.

-Our deep-set commitment to our customers defines how we do business, and our years of experience working across industries underpin the vast array of services we offer.

-Our understanding of your industry, combined with insights from our Centers of Excellence, allow us to more efficiently equip your business with proven solutions that incorporate industry best practices.

-With engagement models that match the size and scale of your operations, we support your business goals and offer partnership opportunities based on gain-share and risk-share models, as appropriate.

-Whatever your business needs or aspirations, we have the in-depth knowledge, world-class processes and standards, and relationship-based approach to put the right solution in place.

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-Customers that have already learned what it means to experience certainty hail from a wide range of industries:

- Banking & Financial Services :-

With a wealth of experience partnering the world's leading banks and financial institutions, and a comprehensive range of services and solutions, TCS is the partner that gets you results: optimized investments, enhanced operational efficiencies, minimized risk and sustained cost leadership.

TCS BaNCS :-

TCS BaNCS enables transformation in financial services through a superior and holistic suite of solutions for <u>banks</u>, <u>capital market firms</u>, <u>insurance companies</u> and diversified financial institutions. Each solution in the TCS BaNCS family has been designed to run as a scalable and robust service, fully integrated with existing business models, enterprise infrastructures and technology architectures. With our collaborative and innovative approach, financial services organizations can gain the following:

>A competitive advantage and provide differentiated solutions to their customers

>Increased operational efficiency and agility

>Certainty in delivery

TCS BaNCS is a globally recognized industry leader, with its solution consistently recognized by industry experts.

- Energy, Resources & Utilities:-

At TCS, we work with some of the largest energy majors worldwide, focusing across the energy value chain. With a combination of technology and domain expertise, backed by our vertical-focused center of excellence, we define and deploy innovative, reliable and responsive solutions to achieve business objectives.

We have helped global energy companies achieve business agility through Business Transformation, IT enabled process standardization, Optimization of costs and Deployment of best in class decision support systems. From wells to wheels experience with TCS.

>The TCS Advantage

- A global footprint across the Americas, Europe and Asia

- 4,000+ experienced energy consultants

- Alliances and memberships

with <u>SAP</u>, <u>Oracle</u>, <u>Microsoft</u>, <u>EMC</u>, <u>ESRI</u>, <u>OSIsoft,</u> etc.

- Over a 100 engagements spanning 40+ customers across the globe.

- **Government:-**

To meet the expectations of multiple stakeholders in a challenging environment, governance needs to be nimble and effective. ICT-enabled solutions for governments can help achieve this through process efficiencies, technology scalability, feature-rich business functionality, customized mapping with government functions at different levels of administration and analytics to enable planning and decision-making. Transparency and accountability can also be built into government process workflows with an outcome-based approach.

We provide comprehensive solutions for central as well as local governments. Built on domain knowledge, process reengineering and state-of-the-art ICT systems, these solutions address all aspects of governance including office automation, file management, workflow management, budgeting and financial management, knowledge management, payroll processing, and asset and inventory management. The solutions serve as a general platform on which department-specific functionality can be built for your line functions. Successful engagements in several countries and across various government environments enable us to leverage global governance best practices while implementing Best in class" ICT solutions. We provide governments with real-time information, services and analytics by using next generation technologies and design architectures that utilize government networks, the internet and mobile communications, to render public services. In addition, our existing frameworks in multiple domains such as financial management, taxation, human resource management, law

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enforcement, healthcare, and office automation among others, allow rapid deployment of solutions.

- Life Sciences & Healthcare:-

TCS' **Life Sciences** Solutions and Services help Pharmaceutical, Biotech, Medical Devices and Diagnostics companies to accelerate drug discovery, advance clinical trial efficiencies, accentuate manufacturing productivity and amplify sales and marketing effectiveness.

-With over two decades of experience in working with global life sciences companies, in diverse geographies, TCS, your trusted partner and advisor, will help you in your transformation journey, through its people, platforms and products / services across the value chain. We have:

-A global footprint across Americas, Europe and Asia

-Strong domain skilled workforce comprising of Physicians, PhDs, Biomedical Engineers, Pharmacologists, Pharmacists, Practicing doctors

-Engagements with over 12 of top 15 pharmaceutical companies and 8 of top 10 medical devices manufacturers

-We deliver quantifiable business value to the life sciences industry through unmatched domain expertise, innovation and execution.

TCS enables **Healthcare** organizations to reimagine their business and transform their operations, to become consumer-oriented companies and improve the quality and outcome of care.

TCS implemented a Salesforce.com CRM solution for a UK-based health insurer, improving their customer experience and retention rates. The solution increased the total retained annual premium income by over GBP 400,000 and the customer contact rate by 7%.

- High Tech:-

TCS creates value for different organizations with the following:

Complete services model: Our comprehensive service portfolio of solutions, business, product engineering services, infrastructure services and business process services enable you to focus on core

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competencies, lower operational cost and drive global service standards.

Partnerships and Global Alliances: We leverage mutually exclusive capabilities that ensure successful 'go-to-market' initiatives, enhanced product performance and effective industry and segment-specific solutions.

Focus on innovation: Dedicated Innovation labs, infrastructure support and the Tata Research Development and Design Center (TRDDC) provide access to leading-edge technologies, advanced systems engineering methodologies, storage optimization, and convergence and embedded printer solutions.

Solutions TCS Offer:

We provide optimal, customized and comprehensive solutions across varied industry segments:

Computer Platforms and Services

Software

Electronics

Semiconductors

Professional Services

Some of the domain-specific offerings for our high tech customers include the following:

Software Product Engineering Solutions

Storage Product Engineering

Microsoft Business Intelligence Enablement Solution

- Insurance:-

TCS enables leading global insurers with business transformation, customer experience and operational efficiency needs. Our full services portfolio and unmatched track record make us a trusted advisor and partner of choice for the industry.

Insurers continue to face a challenging environment on the account of rising operating costs, significant losses from catastrophic events, reduced demand, decreased growth in developed markets and low investment yields. The situation is compounded by the rapidly

changing customer buying behavior and ever-widening regulatory landscape.

Global insurers are making technology investments to reduce costs and improve customer retention – multi-channel integration, mobility, enterprise risk management, data analytics and business intelligence, social media, fraud detection, legacy modernization and cloud computing.

The impact of a decade of mergers means insurers are more focused on increasing operational efficiency by investing in legacy modernization and innovation initiatives to transform their policy and claims administration systems.

- Manufacturing:-

Global manufacturers are trying to reduce operational expenditure, invest in process improvement, utilize existing capacity optimally and increase efficiencies, while maintaining product quality and meeting safety and regulatory norms. TCS' Manufacturing

Solutions provide you the bandwidth to innovate on business models, leveraging contemporary technology solutions.

All roads lead to TCS and its not just our word alone. One in three Fortune 500 manufacturing giants partner with us. TCS is a partner of choice to global organizations and has a proven track record of delivering real, measurable business benefits from shop floor to boardroom.

We provide multi-dimensional services spanning IT led business transformation, design, development and support for IT solutions, and value-added services such as outsourcing, infrastructure management and consulting. Each solution is carefully crafted to drive competitive differentiation.

- Media & Information Services:-

An exponential growth of online media users is challenging the established business models for media and information services companies and creating new revenue opportunities.

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TCS' Media and Information Services help you understand the impact of disruptive technologies and profit from the boom in digital consumption.

TCS provides end-to-end content value chain solutions and services for the media and information services industry. From content creation and management to publishing and distribution, we have the capabilities to build, deploy and support the appropriate solutions to meet your needs.

- Retail & Consumer Products:-

Retail and consumer product companies operate in environments that are highly dynamic, with new challenges and opportunities emerging constantly.

TCS' fast-growing Retail & Consumer Products unit offers a fully integrated organization that embeds end-to-end capabilities to help you achieve success.

Equipped with extensive industry, technology and delivery capabilities, we work with you to provide solutions and services that

address strategic and operational challenges, optimize business performance, align technology with business priorities, reduce cost, improve margins and constantly sharpen competitive advantage. We have invested in a rich set of solution offerings, assets and accelerators to increase ROI and decrease the time-to-value of your business and IT programs.

- Telecom:-

More now than ever before, Communications Service Providers (CSPs) are looking for ways to transform their legacy, plan ahead for transformation required to secure future in the digital age. With the proliferation of smart devices and traditional voice communication being eclipsed by data traffic over wire and wireline networks, digital-re-imagination has emerged as the single most important trend. Service providers are being stimulated to transform themselves into a platform of opportunities harnessing the digital five forces— Mobility & Pervasive Computing, Big Data and Analytics, Social Media, Cloud Computing, and Artificial Intelligence and Robotics—to reimagine their business processes,

products, and services. The digital transformation is helping the CSPs mitigate the challenges of shrinking product lifecycles, customer engagement and high churn rates.

Our offerings help telecom companies simplify their businesses while maintaining the profitability, quality of service and customer experience. Our rich industry experience and domain expertise enables us to deliver a suite of offerings which addresses the key areas of - service quality management, expansion of core capabilities into adjacencies, process automation, data monetization, network management and implementation of next generation technologies.

For over three decades, TCS has worked with companies in the Communications industry, helping them develop world class solutions and systems, simplify operations, augment network services, diversify into new markets, and stay ahead of the competition. Our solutions address the entire landscape of telecom businesses, ranging from greenfield start-ups to large cable and satellite companies and equipment vendors.

Our partnership model leverages ready-to-deploy platform solutions, proprietary frameworks, and solution accelerators to enable our clients to launch new products and services quickly. TCS' investments in next generation platforms, mobility solutions, capabilities, and lab infrastructure are aligned to address our clients' key business imperatives of operational excellence, customer experience, and revenue enhancement.

We have helped enterprises unlock business value in the areas of Digital Channel and Commerce, Customer Insights, Mobility Solutions, Hosted OSS/BSS (HOBS), IOT & M2M Platforms, Connected Device Management, B2B Platform Ecosystem and Services and Network Abstraction layers.

- Travel, Transportation & Hospitality:-

TCS helps companies in the Travel, Transportation and Hospitality industries leverage technology to comprehensively, innovatively and cost-effectively address their most pressing business needs.

TCS has brought to the table both width and breadth of knowledge of the airlines industry as well as other industries around them, which they operate in.

So for us it's been a win-win situation because we have only got innovation from within the airlines industry, we have got innovations from other area" - **Bhavin Lachani, Engineering Systems & Business Intelligence Manager, British Airways**

TCS helps travel, transportation and hospitality clients manage revenue cost equations, operate existing businesses effectively and build new transformational programs.

TCS provides transformation services in enterprise systems, legacy modernization, process re-engineering, e-commerce, specialized flight systems, transaction processing systems and loyalty management solutions.

Our solutions cater to the entire value chain of the following industries:

>Airlines

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>Hospitality

>Railways

>Transportation & Logistics

TCS' comprehensive set of BPO offerings for the travel, transportation and hospitality sector includes revenue accounting and fare audit, fare filing, loyalty bonus program administration and more.TCS helps travel, transportation and hospitality companies better align their IT strategy and initiatives to their business goals, and takes responsibility of implementing these strategies, delivering a level of certainty of results no other firm can match. Partnering with TCS will result in the following benefits:

>Reduction in IT operation expenses by up to 30%

>Improved ROI on IT capital expenses

>Ability to integrate IT, BPO and infrastructure services to create truly innovative solutions

>Access to TCS' Innovation Labs and Co-Innovation Network

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1.2 Existing System and Need For System:-

Existing System:-

The existing system is a centralized system which is capable of identifying the vehicle condition.

The system is installed in Automobile workshop station in various geographies.

The system is connected to a vehicle through a wire connection.

The entire history of the vehicle is stored at a centralized database server.

All the vehicle identification is done by a unique identity known as **Vehicle Identification Number(VIN).**

Client currently use "Web Based" diagnostic systems to diagnose, repair and maintain vehicle system malfunctions.

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Need For System:-

Client want to develop Alliance Diagnostic Tool which not only meets the need of the technicians but also of the service staff.

The system should have all the basic features of the current systems and newly added functions.

Technician can use ADT Tool to read VIN information, DTCs and PID data values from the vehicle. ADT Tool interfaces with the analytic's server(VIRTUAL SERVER) and provides VIN information to the Inference Engine. The Inference Engine retrieves the diagnosis and symptom information stored by Service Advisor using ADT Tool.

Using this information and the fault model, Inference Engine provides following results to ADT Tool:

a. Prioritized List for the operations to be performed.

b. Ranked list of possible component repair procedures.

In Diagnosis mode, the Prioritized List with associated DTC diagnosis procedures can assist Technician to diagnose the problem. In Symptom diagnosis mode, the ranked list of possible component repair procedures can be used to diagnose the problem.

Through the guided diagnosis procedure, ADT Tool can continuously interact with Inference Engine and upload updated symptom, DTC and PID information to provide an updated ranked list of possible repairs.

The fault model can also provide component repair procedures and wiring diagram references to the ADT tool.

Proposed ADT tool can detect all the ECUs present in vehicle using System Call Function or can detect single family ECU using Single System call Function.

Tool will support better organized Serialization methods during data loading to enhance the performance at runtime.

System Call:-

1. During System Call, Application provides feature to detect the ECUs on the basis of the vehicle name.

2. In all system call, first Application will perform VIN reading and will request the latest information present in database Server.

3. This information will be used to filter out actual ECUs present in vehicle irrespective of data present for that vehicle. This feature will enhance system call performance by eliminating communication with unmounted ECUs.

4. In stand alone mode, Application will use diagnosis data present on local machine.

5. Application will perform all System call parallely with multiple ECUs.

Customer Reception:-

1) Customer reception application in TCS proposed ADT tool will detect VIN either through VCI or from barcode scanner. Also Service Advisor can manually enter VIN in ADT Tool. If VIN is not available then Service Advisor can select the vehicle type directly.

2) SA can select symptoms from the available list or/and can add new symptoms during discussion with the customer.

3) Tool will generate job card having repair procedure suggested by Analytical server.

4) SA can perform vehicle identification and customer interview but cannot perform quick diagnosis for legacy vehicle.

Dealer Technician

1) Dealer Technician can view problems, symptoms and repair procedure (with reference to ADT tool) for the legacy vehicle using ADT tool.

2) ADT tool will detect VIN from the vehicle and identify whether vehicle is a legacy or not.

3) In case of legacy vehicle tool will use components of legacy diagnostic tool in background.

4) All the business logic, diagnostic data loading, sequence execution will happen by the legacy components.

5) But the user can get an impression that he/she is working with new ADT tool.

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1.3 Scope of Work:-

The entire system is build by following the traditional software building model.

The need for the system is the enhancements to be made in it such as dependency of a specific computer (software and hardware) system.

Enhanced and easy user interface for quick access.

DEVICE independent system i.e. the system should work on different types of devices of different configurations.

The system can be made available to user 24x7 for access.

The system will be able to detect the current and exact problem of the vehicle condition.

The Alliance Diagnostic Tool is designed to provide a highly modularized, smart diagnostics solution which aims at reducing the

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overall repair time through analytics, guided diagnosis and integration of service and repair information.

It is designed keeping in view the workflow in a typical after-sales scenario.

Features in scope are:

- Big Data Analytics

- Diagnostic Applications -

    Customer Reception Application

    Full Diagnostic Application.

- Data Authoring Tools

- Diagnostic Middleware

- Vehicle Communication Interface Device 6.

- Measurement Interface Device

The features that are out of scope are:

Network Techline assistance service for existing tool.

Device Distribution to dealership.

ADT is designed to support multiple platforms. It provides multiple functionalities useful at different stages of After sales processes. For a convenient and accelerated diagnostics, keeping in view the requirements, the client application is modularized as follows :-

The solution is divided into different modules as described below:

A. ASAM Diagnostics Server -

ASAM Diagnostics Server (or Diagnostic Server) component contains the ASAM 3D runtime module (D-Server).

D-Server enables the Tester application to communicate with VCI during vehicle diagnostics. Diagnostic data in serialized format is used by D-Server.

The D-Server used in ADT will comply to ISO-22900-3 standard.

The D-Server can be deployed in three modes:

- D-Server hosted on LAN

- D-Server hosted Remotely (on Cloud)

- Standalone Mode

Diagnostics Server will also contain a Sync Tool which to get the latest data from the Distribution Server.
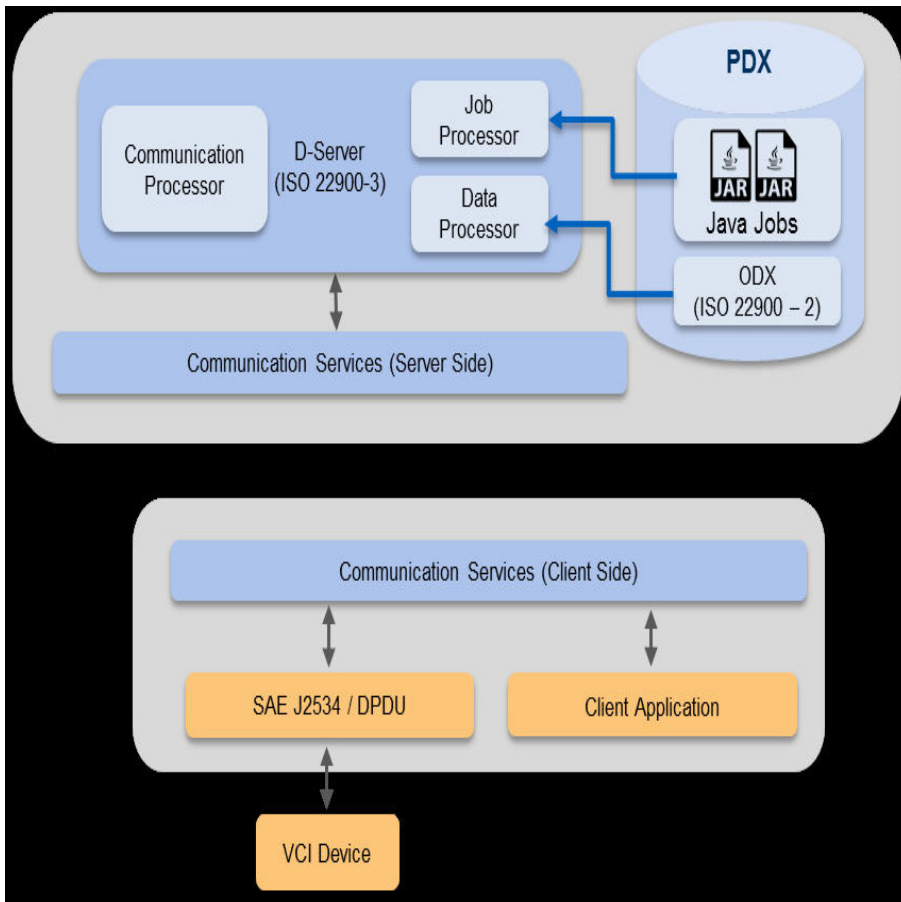
B. Application

- **Customer Reception Application:-**

Customer reception application used by Service Advisor, consists of following functionalities :-

-**Entrance Check:** Provides features for capturing voice of customer, performing Quick diagnosis and creation of Job Card at Service center reception

-**Exit Check:** Provides features for Quick diagnosis, informing customer about the diagnostic repair performed and gathering Customer feedback before delivery

- **Full Diagnostics Application**:-

This is the complete feature rich diagnostic application that will be used by the dealer technician for diagnosis of the vehicle. The primary user is intended to be a Authorized technician.

C. Authoring Module

Proposed Authoring Tool will be a revolutionary server based system supporting multiple users and multiple languages. It will form the backbone of the Alliance Diagnostic System by providing efficient support for Data Creation (ODX files, OTX sequences), Maintenance and Availability of the latest Diagnostic data and related Manuals. This tool will cater to all the phases of vehicle value chain namely Engineering, Production and After Sales, thus providing uniformity of operations and eliminating the need for multiple tools. The tool will simplify the data exchange process between suppliers and OEMs by standardization of diagnostic data. Authoring Tool will store the diagnostic data in Authoring database which would be synced to Nissan and Renault diagnostics servers. Authoring Tool can be integrated with ASAM D-Server (MCD3D runtime), OTX engine and Simulator interface for supporting real time validation of ODX

data and OTX sequences. Authoring tool consists of the following key components/features:-

• ODX Editor	• OTX Editor
• Data Storage and Maintenance	• Notification provider
• Serialization Tool	• ESM Linker
• Convertor Tool	• Wiring Diagram
• OEM Data Migration.	• Coding Data Creation

D. Analytics System

The Analytics system will provide an interface to the Customer Reception and Diagnostic Application to retrieve the

following:-

      ☐ Vehicle specific symptom list

      ☐ Estimated time to repair for given case of customer interview and quick diagnosis results

      ☐ Prioritized list of possible repair procedures and DTCs for given case of customer interview and quick diagnosis results as input

The proposed Data Analytics System uses data mining techniques of field failure data to develop vehicle wise fault models. The Analytics server will store vehicle wise fault analysis results (fault models) from the proposed Data Analytics System. Analytics Server provides the results through web services which are consumed by Customer Reception and Diagnostic Applications.

E. Distribution System

The distribution system is responsible for license management and distribution of data and runtime.

It manages the whole delivery system through a secured process. Sync Tool present on the Diagnostic Server connects with distribution server and checks for updates based on the subscription.

1.4 Operating Environment (Hardware and Software):-

ADT hardware consists of a main microprocessor board with following components:

☐ MPU

☐ Data flash

☐ RAM

☐ USB HS controller

☐ Wi-Fi module

☐ Optional BT module

☐ Optional Ethernet interface

Measurement hardware shall support 32bit processing with at least 256MB of program and data flash and 256MB of RAM. ADT3 hardware is based on DRA60x/DRA61x microprocessor.

WF121/WF111 Wi-Fi module and BT module BT121/WT11i by Bluegiga has been selected. Other manufacturers suitable to compare and make the optimal selection to match the requirements can also be considered.

BT module specifications:

Parameter	Specification
Class	Class 1
Interface	SPI/UART
Antenna	Integrated
Stack	Fully embedded Bluetooth® v3.0
Environmental qualification	Bluetooth qualified CE, FCC and IC Asia Pacific

Wi-Fi selection criteria:

Parameter	Specification
Protocol supported	802.11 b/g/n
Interfaces	SPI/UART
Frequency	2.4 Ghz
Output power	12 dbm
Data rate	11 Mb/s, 54 Mb/s
Antenna	Integrated
Security	WEP, WPA, WPA2

RAM requirement estimation:-

	RAM Estimates		Size (MB)	
Global`	Global Request Response Buffer (1024KB)		1.024	
	Script Global Buffer 128 KB		0.128	
	ECU reprogram Data File /VDR record file 128 MB		128	
	3 CAN simultaneous communication at 500 kbps is 400 KB		0.4	
	Stack	Stack space for TCP/IP stack + USB Host+ SD CARD Lib runtime variable (2MB)		2
Stack space for business logic			1	

run time variable (1MB)		
All tasks stack size 360 KB	0.36	
Variable space for unidentified items at present (3MB)	3	
Code	Image of firmware application + File system for execution from RAM (5MB)	5
Boot loader (1 MB)	1	

1.5 Detail Description of Technology used-

The technology used to develop the system is Java SE(Standard Edition). The application which is developed is based on swings api of java technology. The client can interact with the system using the screen controls presented by the system. The system can be installed on hardware which is having Windows operating system or the OS which is capable of running the windows default program extension i.e(.exe).

The system is generally deployed in a medium space closed workshop or premises having connected by multiple PC's over LAN(Local Area Network).

The functioning of the system can be carried out with the help of a remote powerful computer hardware generally a local server which is based on windows platform as well.

The backend of the system is MySql database in which the details of the system are stored.