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# 1. Introduction and Executive Summary

An automotive dealer who has been expanding greatly in the last 10 years by adding new stores wants to understand, design, implement, test and release their new Web Page. They also want to have the web page to contain their internal Web Application, accessible only to their employees.

This is a great opportunity for us to get a hold on the Dealership market. General Customers are expected to be provided with a Welcome page that contains basic information about the company. Internal Employees are expected to be provided with User Registration and login option for an employee portal that gives access to the web application.

The web application should be secure and be able to handle 500 simultaneous connections at any given time thus making it highly available. We will be committing to a tight timeline of 3 months. They trust our team’s expertise in order to improve the requirements as well as in coming up with the proposal of new requirements that were not identified up to this point.

Since our company has been trying to gain access over the Dealership market and get more customers this would be a promising project for us as we are dealing with a very big customer. The money obtained by this project completion would really help our company’s expansion in a large scale. It would help us invest in more projects that help us grow in this field.

# 2. Objectives

## 2.1 BUSINESS Objectives

The following is the list of business objectives:

**Objective 1**: Market share – increase our company’s share in the market.

**Objective 2**: Expansion of business by gaining access to the Dealership market.

**Objective 3**: Become #1 player in the segment.

**Objective 4**: Gain and build trust of the customer that can enable us to host the web application in cloud.

**Objective 5**: Deliver high quality product to increase credibility.

**Objective 6**: Reduce the cost of the customer to make them prefer us again for business.

**Objective 7**: Understand the customer and achieve Customer Satisfaction.

**Objective 8**: Gain huge monetary benefit by successfully completing the project for such a big customer.

## 2.2 SYSTEM Objectives

The following is the list of system objectives:

**Objective 1**: Operating Systems – Operating System to be used for this project is latest stable release of Fedora (Red Hat Enterprise Linux)

**Objective 1**: Number of Users – Able to handle 500 simultaneous connections at any time. This can be achieved by using the concept of Concurrency in Operating Systems as well as in Database.

**Objective 2**: Security – Application should be secure and should make use of state-of-the-art modern Authentication technology like 256-bit AES with Dual security (Two factor Authentication).

**Objective 3**: High Availability – Application should be available whenever needed by the customer or employee.

**Objective 4**: Project will use web-based technologies such as HTML, CSS, React JS, PHP.

**Objective 5**: Server – The web server used for this project will be either Apache Tomcat 9.0 or Node.js.

**Objective 6**: Google Search will be integrated into the system for search

**Objective 7**: Database – The relational database used for this project will be MySQL and NOSQL database used will be MongoDB.

**Objective 8**: API – The Java Persistence API such as Hibernate will be used for other functional requirements

**Objective 9**: Welcome – Basic information about the company, such as who the company is, history, board of directors, list of addresses for all its current 6 stores, employee portal, etc.

**Objective 10**: User Registration – Employee should enter personal information such as badge #, name, gender, department, username, password, etc. before a login page is provided.

**Objective 11**: Login – Employee must login from the employee portal to get access to the web application.

**Objective 12**: Makers – CRUD of auto makers and other related information are provided.

**Objective 13**: Models – CRUD of auto models and other related information are provided.

**Objective 14**: Customers – CRUD of customers with related information are provided.

**Objective 15**: Inventory – Able to maintain the entire inventory of autos.

**Objective 16**: Sales – Able to maintain detailed records about all sales. Tied to inventory and customers.

**Objective 17**: Notes – Enable employees to keep personal notes about anything, such as requests, questions, to do items, etc.

**Objective 18**: Search – To enable employees the search of customers, makers, models and sales.

**Objective 19**: Hardware – Requires servers to build company’s own datacenter to host the software in the company itself. Both Application and Database servers are required. Red Hat Enterprise Linux *x*64 (64-bit) version 6.*x*

**Objective 20**: Software – Requires software licenses required to run the application in the company’s own datacenter. Software licenses for Development tools like IDE, Testing applications, Operating System Fedora license, Database MySQL licenses

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# 3 Project Feasibility, Risks and Metrics

Project feasibility and metrics are summarized below:

## 3.1 Project Feasibility Concerns

**Market readiness:** The software product might not be fully market ready without any defects. There might be some minor functionality that might need a little more testing such as, the feature that recommends the customer, which product could be bought along with the auto model that they have chosen. There is a possibility of presence of latent defects in the web application. It is highly impossible to create a system without a single minor defect.

**Technical issues:** When there are a huge number of users (more than 1000 users) at a point of time, there might be a server failure, or the server might come down. Load balancing issues might occur

**Resources:** There is a possibility of Server failure. Hardware failures are possible to occur. Some human resources might leave the company or apply unexpected sick leave or meet with accidents or death.

**Cost:** Cost of the project might increase if there are additional functionalities added to the requirements. A field research was conducted in the dealership market with the potential customers and the result of the survey said that this web application could be developed with a moderate to high price as mentioned in the ‘Project Tasks, Schedule and Cost’ section below.

**Time to market**: If client requests for additional requirements, the project timeline might increase from the normal delivery time. Good word of mouth is required from the clients for our company to gain complete hold of the dealership market.

**Competition:** The one USP (Unique Selling Point) of our company in terms of project delivery is High Quality and our urge to exceed the expectations by delivering extra features with a futuristic approach that would be useful for the customers and for the dealership company’s marketing. Our past records regarding relationship with the customers is good.

## 3.2 Project Risks

**Risk 1 - Natural Calamity:** If there is any kind of natural calamity such as Earthquake, Floods, Hurricane, Tornado etc. the datacenter set up might get damaged if it is placed in a normal building.

**Mitigation action 1:** We will provide the datacenter in a basement level or underground, so that it doesn’t get affected by any of the natural disasters. Alternatively, the concept of resource redundancy is used where a backup of the application will be taken frequently and maintained by our company in a different location. Backup generators will keep the servers up in case of power failure.

**Risk 2 - Employee resignation:** If a key employee leaves the company in the middle of the project, there might be a delay in the deliverables and the project period might extend beyond 3 months.

**Mitigation action 2:** There is always a backup created for each person in the project which will give the project stability to meet the deadlines in a timely manner. Good documentation practices will be strictly followed by the team.

**Risk 3 - Funding/Cost of project:** The funding provided by the dealership client is not enough to come up with the project.

**Mitigation action 3:** Money management measures and Cost Estimation are to be done using industry standards. Customer must be continuously updated about the cost incurred by the project.

**Risk 4 - Project Deadline:** Timeline of 3 months provided is not reasonable enough and it is not enough to complete the entire project.

**Mitigation action 4:** Basic and functionalities with high priority are delivered first and the developers work period gets extended until the project is entirely complete.

**Risk 5 - Hardware Failure:** Short circuit or Failure of servers that might lead to service shutdown.

**Mitigation action 5:** Use of reliable hardware components. Backup hardware components made available.

**Risk 6 - Information Security:** There is a possibility of revealing customer data due to espionage and eavesdropping.

**Mitigation action 6**: Use of secure HTTP protocol (https://) and 256-bit AES encryption for data transmission.

**Risk 7 - Denial of Service attack:** If a single user accesses the website a lot, then it might not be available for other users.

**Mitigation action 7**: Configuring firewall or the router to block DNS response outside of the network (By blocking UDP port 53).

**Risk 8 - Load Balancing**: Unable to distribute the requests among the servers equally.

**Mitigation action 8**: Using a distributed hash table to distribute all the requests evenly among the servers.

## 3.3 Project Metrics

Whenever there is a release to the customer, there is a specified threshold on quality over which the delivery is unacceptable. Such thresholds and their descriptions are listed below.

|  |  |  |
| --- | --- | --- |
| **Measurement** | **Description** | **Acceptable Threshold level** |
| Percentage of Feedback | The percentage of reviews or feedback received from the customer that says that software is good | Greater than or equal to 80% |
| Severity 1 Defects per line of code | The number of high priority severity 1 defects found for 1000 lines of code (sample value) | Not more than 2 defects |
| Severity 2 Defects per line of code | The number of medium priority severity 2 defects found for 1000 lines of code (sample value) | Not more than 8 defects |
| Severity 3 Defects per line of code | The number of low priority severity 3 defects found for 1000 lines of code (sample value) | Not more than 15 defects |
| Percentage of server failures | The number of times server failure has occurred for every 30 days | Not more than twice |
| Number of users using the system | The number of users using the website at a point simultaneously | Not more than 500 |
| Level of Adherence to amount | By November 3, we should have spent only $30,000. If it is more than this budget we will continue to over-spend till the end of the project and end up with no money. | Not more than $30,000.  100% adherence |
| Level of Adherence to schedule | By first week of November we are expected to complete 90% of the project | Not less than 90% |
| Percentage of profit | The percentage of profit gained by our company as a result of completing this project successfully. | Not less than 50% profit |
| Percentage of automotive sold | The number of cars or automotive sold after using our application | 50% increase from last year |

In any case if the project metrics go beyond the threshold level our performance as a company is bad and the web application performance and feedback will eventually get affected.

# 4 Project Scope and Process Model

Project scope includes the following:

1. Customers will be able to see a Welcome page.
2. Employees will be provided with a user registration and login from the employee portal
3. Employees will be given Inventory and Sales pages for their disposal
4. Customers will be able to browse through the system the various Makers and Models of autos.
5. Customers will be able to settle their payments using a credit card.
6. A complete track of Customer’s order history and the respective payments will be maintained.
7. Employees will be able to fill in their details for User registration by themselves.
8. Each automotive in the web application will have a prototype display image and a description for that product.
9. Customers will be able to view their purchase and order history with just the order number.
10. Shopping cart feature will be enabled to the customers to increase good user experience.
11. Training customers

The following is a list of items out of scope:

1. Some more payment methods could be added such as Debit Card, Cash payments, Easy installments, etc.
2. The web application could be developed in Android and iOS platforms for mobiles and other portable devices
3. If there is an increase in the number of customers, number of servers could be increased
4. Surveys could be conducted, and feedback could be taken from the customer about the user experience for our web application
5. Customer grievance could be listened by way of maintaining a forum for complaints and issues.
6. Based on customer search, some recommendations could be given about the other related products that could be bought along with this automotive by performing some data analysis.
7. Return items feature could be added as a functionality to this web application.
8. Exchange of items is also a good functionality.
9. Re-sale of old automotive or their parts could be facilitated to increase the ease of finding all automotive related solutions in one place.

## 4.1 Project Process Model

The project model selected for this web application project is incremental model. The incremental model is a software system is delivered in small increments, thereby avoiding the Big Bang effect. The waterfall model is employed in each phase. The user is closely involved in directing the next steps. Incremental development prevents over-functionality. The Incremental Approach uses a set number of steps and development goes from start to finish in a linear path of progression. Incremental development is done in steps from design, implementation, testing/verification, maintenance. These can be broken down further into sub-steps, but most incremental models follow that same pattern. The Waterfall Model is a traditional incremental development approach. Customer feedback is highly useful in this model. When development is done in pieces, the partial product is delivered and improvements in the system are made in the next release. Another partial product is released the next time with improvements specified in the previous release. This makes the incremental model to use the entire waterfall model every time it makes a release to the customer. Based on the priority of the functionalities to be implemented, the requirements are chosen for delivery. The advantages of incremental model are it generates working software quickly and early during the software life cycle. More flexible – less costly to change scope and requirements. Easier to test and debug during a smaller iteration. Easier to manage risk because risky pieces are identified and handled during its iteration. Each iteration is an easily managed milestone.

## 4.2 Project Context

A high-level diagram of the proposed approach/components is shown below:

**Customers**

**Makers**

**Welcome Page**

**Database**

**Application Server**

**Bank**

**Models**

**Notes**

**User Registration**

**Login**

**Search**

**Inventory**

**Sales**

# 5. Assumptions and Constraints

## 5.1 ASSUMPTIONS

The following is a list of assumptions:

* **Computer Operation**: Both the customers and the employees know how to operate a computer.
* **Internet Connection**: Both the customers and the employees have a proper internet connection set up that is reliable.
* **Customer Knowledge**: The employees have enough knowledge on automotive.
* **Operation**: Both the customers and the employees know how to navigate and operate a website or web application.
* **Website availability**: The website is available whenever there is an internet connection.
* **Website Language**: The language used for the website is English or Spanish
* **Payment:** Customers can pay only through Credit cards.
* **Work hours of resources:** All resource people involved in the project work for 8 hours a day in this project.

## 5.2 CONSTRAINTS

The following is a list of constraints:

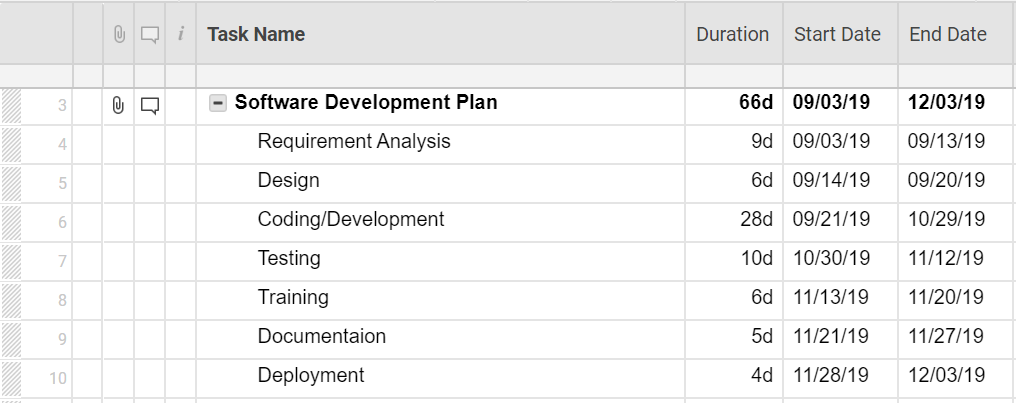
* Any person who does not know how to use a computer cannot make use of our web application
* If there is no internet connection, our website is not accessible.
* If the employees don’t know much about automotive, navigation of the website might be difficult, and searches made may give undesired results.
* If a person does not know how to operate a website, they might find it difficult to use our application.
* Website will not be available in areas without internet connection.
* This website is understandable only to people who know English or Spanish. People who don’t know these languages might find it very difficult.
* Customers who want to pay using Debit card, Cash or other installment options will not be able to pay as the website is restricted only to Credit card payments.
* If the work hours of people in the project is less than 8 hours it is impossible to complete the project within the specified deadline.

# 6. Project Tasks, Schedule and Cost

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Level No.** | **Tasks** | **No. of units** | **Cost/hour** | **Total cost** |
| 1.0 | Project Management |  |  |  |
| 1.1 | Project Manager | 1 | $100 | $52,000 |
| 1.2 | Resources | 5 | $50 | $26,000 |
| 2.0 | Health insurance (50% extra surge) |  |  | $120,000 |
| 3.0 | Hardware |  |  |  |
| 3.1 | Servers | 4 | $2,000 | $8,000 |
| 3.2 | Monitors and Desktops | 6 | $5,000 | $30,000 |
| 3.3 | Other Devices | 6 | $500 | $3,000 |
| 4.0 | Software |  |  |  |
| 4.1 | Operating systems License | 6 | $60 | $360 |
| 4.2 | Database License | 1 | $200 | $200 |
| 4.3 | Other security licenses | 6 | $100 | $600 |
| 5.0 | Testing | 6 | $50 | $300 |
| 6.0 | Training |  |  |  |
| 6.1 | Creating backups | 6 |  | $10,000 |
| 6.2 | Learning and Skill development | 6 |  | $80,000 |
| 7.0 | Recreation and Team outings | 6 |  | $20,000 |
| 8.0 | Project Reserve for emergencies | 1 |  | $150,000 |
|  | Total Project Estimate |  |  | $500,460 |

The project cost estimate without any profit is $500,460. The profit margin is 50%.

The project cost estimate along with the profit margin is $750,690.



# 7. Conclusion and Recommendations

The project requires a lot of testing during the requirement phase and the design phase. This is done to identify most of the defects and eliminate then at an early stage. This eventually will reduce the cost and increase the quality of the product. The website is designed in such a way that the customers have an ease in using the product.

The critical risks involved in this project is the tight deadline of 3 months. With only 6 resources it is only possible to finish the project partially by implementing the main functionality of the project like the login, Makers, Models, Payments, Inventory and Sales. The main functionalities could be implemented with high quality and very less defects in 3 months. The rest of the project could be finished if extra 2 months are given.

I would recommend the board of directors to increase the resources and accept the project as this will give a lot of monetary benefit. Money, we get from such a big customer will be highly useful in investing in company’s future projects. The profit margin estimates is a minimum of 50%. Taking up this challenging project would open the doors to kore customers in the field of dealership market. Having a trusted and big customer in hand would make us increase our market share. This would be a steppingstone to meeting our business objective of becoming #1 in this segment.

# Appendices

Additional documents or references, if any such as screen shots, web references, hardware details and specifications, etc.

## hardware

| **Platform** | **CPU architecture** | **Version** |
| --- | --- | --- |
| Red Hat Enterprise Linux | *x*64 (64-bit) | 5.5+ |
| Red Hat Enterprise Linux | *x*64 (64-bit) | 6.*x* |

## Server specifications

* CPU: Intel Xeon processor 3 GHz or greater  (4+ cores w/HT)
* RAM: 16 GB or greater
* 1 Gbps or faster network interface
* 100 GB for primary partition1 – Operating System, eConnect Application, Logs, etc
* 1 TB or more for secondary partition1 – Data
  + 500 GB for database2
  + 500 GB for case files and video2
* Video storage volumes (if applicable)

Web references:

<https://www.google.com>

<https://www.geeksforgeeks.org/software-engineering-incremental-process-model/>

<https://www.geeksforgeeks.org/difference-between-waterfall-model-and-incremental-model/>

<https://www.testingexcellence.com/incremental-model/>