Ivan's Auto Repair

System Proposal

Contents

Executive Summary

This report contains the complete systems analysis and designs proposal for Ivan's Auto Repair. The project was completed by our team of information systems students from the R.H. Smith School of Business, University of Maryland, over the course of the Fall 2020 semester. Included in the full report are the detailed results of our three project phases: the Survey Phase, the System Analysis Phase, and the System Proposal Phase.

Summary of Survey Phase

During the survey phase our team interviewed our client and conducted research on the auto industry. After our conversation with the client our team used Wetherbe's Pieces Problem Solving Framework to frame our investigation of our clients problems, opportunities and requirements. From our early review of our clients systems we saw some areas for improvement, one area in particular was the efficiency of our clients processes. Our client's current operation lacks cohesion, when a customer places and orders for service, an email confirming the order and appointment time requires manual entry. Our client operation also lacks the ability to order tires from one system. These are among some of the major issues addressed by the project system solution.

Summary of System Analysis Phase

The system analysis phase utilized information gathering techniques such as document analysis and interviews in order to derive a systems model of Ivan's Auto Repair's business, which addresses the customer relationship management system (CRM) and inventory management. We analyzed the current system using Data Flow Diagrams (DFDS) and Entity Relationship Diagrams (ERD). The data which is stored in the current system can be seen on the ERD .

Summary of System Proposal Phase

The outcome of this phase was the proposed system solution which was guided by our use of the feasibility analysis matrix. Our candidate solutions were made up of one custom solution, and two commercial-off-the-shelf solutions (COTS). The two COTS were Quickbooks and Salesforce, the customs system will utilize kintone to build a database that satisfies the business requirements. The COTS and the custom solution would require subscriptions to the respective companies. All of the proposed solutions would simply require standard office computers and equipment and a stable internet connection to run. Information regarding the proposal can be found on the physical data-flow diagrams, and sample input and output screens, and implementation plan.

Evaluation Letter from Client

December 13, 2020

Ivan's Auto Repair

4116 Howard Ave,

Kensington, MD 20895

To whom it may concern:

This letter is to confirm that Josiah Gavlin, Brandon Smith, Martin Mraz, Prince Nwankwo, and Natalie Rubio, students from the University of Maryland remained in contact with me in order to redesign my shop's information system from September 19 to present time.

The students explained to me their purpose in this assignment. I was very pleased to work with them. We had the chance to discuss my current system, problems I currently have, and opportunities I was looking forward to for a future potential system. The students presented me data flow diagrams, entity relationship diagrams, and reports with their ideas to solve my problems with my current system.

I have been very pleased to have worked with the students. They demonstrated good working knowledge of information systems, professionalism, and good decision making skills. Unfortunately, at this time I do not feel the need to continue with the new designed system. I greatly appreciate all the work and effort put in from the students.

If I can provide you with any additional information, or if you have any questions, please do not hesitate to contact me.

Sincerely,

Ivan Soriano

Owner of Ivan's Auto Repair

ivanautorepair@hotmail.com

Statement of Work

Client and Industry Background

Our client's name is Ivan Soriano. Ivan has been in the auto industry for about 11 years. He owned a shop in Washington, District of Columbia, before named I&O Auto Repair. Ivan now has a shop located in Kensington, Maryland, called Ivan's Auto Repair. The shop has been standing for about three years. Ivan works on the body, mechanical, and any electrical issues that a vehicle may be experiencing. Ivan also provides diagnostics and estimates. Ivan has worked with all brands, models, and year vehicles. He restores antique cars as well.

The Problems, Opportunities, or Directives

Ivan currently has a system that he uses, called All Data Management. The system creates appointments for him. Ivan can also keep track of his inventory and place orders through the system. However, he did mention that it is time-consuming having to send email confirmations for appointments one by one manually. Ivan would prefer a system that can automatically send email confirmations after booking. Ivan even mentioned that he would like a system that allows him to place orders for tires through his system, just like he does for the rest of his parts. He currently has to order separately through a different browser or method that allows tires to be rated. In addition to that, customers cannot make appointments online. If Ivan had a system that could enable customers to make appointments online, that would make things slightly more manageable. The only issue that may arise is finding a way to create software that includes ordering tires. Even dealerships have to go through the hassle of ordering tires through a different browser or system that is not part of their organization. Improving the features that Ivan wants can improve time and efficiency. Some customers prefer to place appointments online, especially on a busy day, when customers cannot get a hold of anyone in the office. Then it would be easier if a customer could create their profile online and make appointments through their account. Creating and working on this system could help Ivan with his clients, improve speed and efficiency, and even allow for ordering from tire suppliers.

Project Scope

The objective of the project is to develop a system for Ivan's Auto Repair to create appointments, keep track of inventory, place orders for car parts & tires, automate confirmation emails to customers, and allow customers to create appointments online. The ways to measure the success of our proposed solution are by solving current problems, scheduling accordingly to meet required deadlines, stay up to date, providing the client with all or most of the possible features that can be added to the current data system, and saving our client time and cost when dealing with daily operations. This overall will improve the efficiency and time consumption of the business.

Deliverables

Future deliverables of the project includes the System Analysis Phase in which we develop a model for the current system and the Design Phase, where we implement a model for the new system.

Milestones

Our group has decided on 5 milestones for our project. They are: initiation, planning, execution, monitoring and closure. The initiation milestone was met after we spoke with the client and discovered his system needs. As of now, we are hoping to cross the planning milestone by the end of the semester. Once we have a good understanding of how the system is going to be improved, we will be prepared to hand the project over to the client before the execution milestone. This includes the actual construction of system improvements. Next, there is the monitoring milestone, which is just making sure the system works consistently. Lastly, there is the closure milestone. This is when the system is complete and running well.

High Level Requirements

Process-oriented requirements include: system must be able to allow customers to book appointments for both online and in-person. System must be compatible with clients' current ordering software. Information Requirements include: system must allow for customers to save information on the website.

Constraints

The virtual nature of the project, the large project objective and each party's availability are the main challenges. Collaboration on such a large project is absolutely vital if the team is looking to find success. This means that each member will need to put more effort into communicating their progress and thoughts with the team each week. It is also extremely important that the team is on the same page as the client.

An open line of communication with the client is necessary to build them the right system. In order to deal with a large project objective and time constraints, communication and dedication are of the utmost importance.

System Analysis Report

Fact Finding Methods

Personal Interview

      The first method we used was a personal interview with the autobody shop owner, Ivan. Over a zoom call, he gave us a tour of the system, showing us the general user interface as well the main features he utilizes. Additionally, Ivan gave us some input on some issues he's experienced with the system that we can alter in the future system.

Document Analysis

      The other method we utilized was Document Analysis of the All Data Management user guide. The guide was essential in the recreation of the system's models for each level of the Data Flow Diagram and the Entity Relationship Diagram due to its step by step instructions of each procedure.

System Models of the Current System

Context Diagram

Ivan's Auto Repair: Context Diagram

External entities:

- **Customer**: This entity represents the clients of the auto body shop.
- **Supplier**: This entity represents any vendor that supplies Automobile parts and tires to the auto body shop.
- **Technician**: This entity represent the mechanics employed by the auto body shop.
- **Management**: This entity represent the front office of the body shop (specifically Ivan).

System Inputs:

From Customer:

- Customer Information (includes personal and car information)
- Customer Payment (payment from customer after job has been complete)

From Supplier:

- Inventory Order Confirmation (vendor sends confirmation form for parts and tires order)
- Inventory Invoice (invoice is sent after order is fulfilled)

From Technician:

- Work Confirmation (mechanic sends confirmation of completed work to management)
- Work Progress (mechanic sends work in progress to management)

From Management:

- Work Request (Management sends work request to Technician to begin to fulfill job)
- Inventory Order (Management sends order to supplier for parts and tires)
- Invoice (Management sends invoice to Customer once job is complete)
- Estimate (Management sends estimate to Customer for inquired jobs)

System Outputs

To Customer:

- Estimate (copy of estimate sent from Management)
- Invoice (invoice for job sent from Management after job is fulfilled)

To Supplier:

- Parts Order(resupply request from Management for supply
- Tire Order (resupply request from Management for tire)
- Inventory Payment (payment send to Suppliers for Parts and Tire Orders)
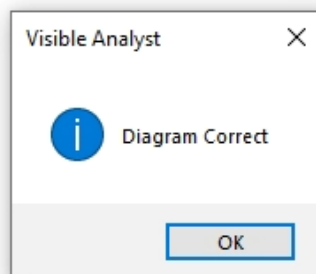
To Technician:

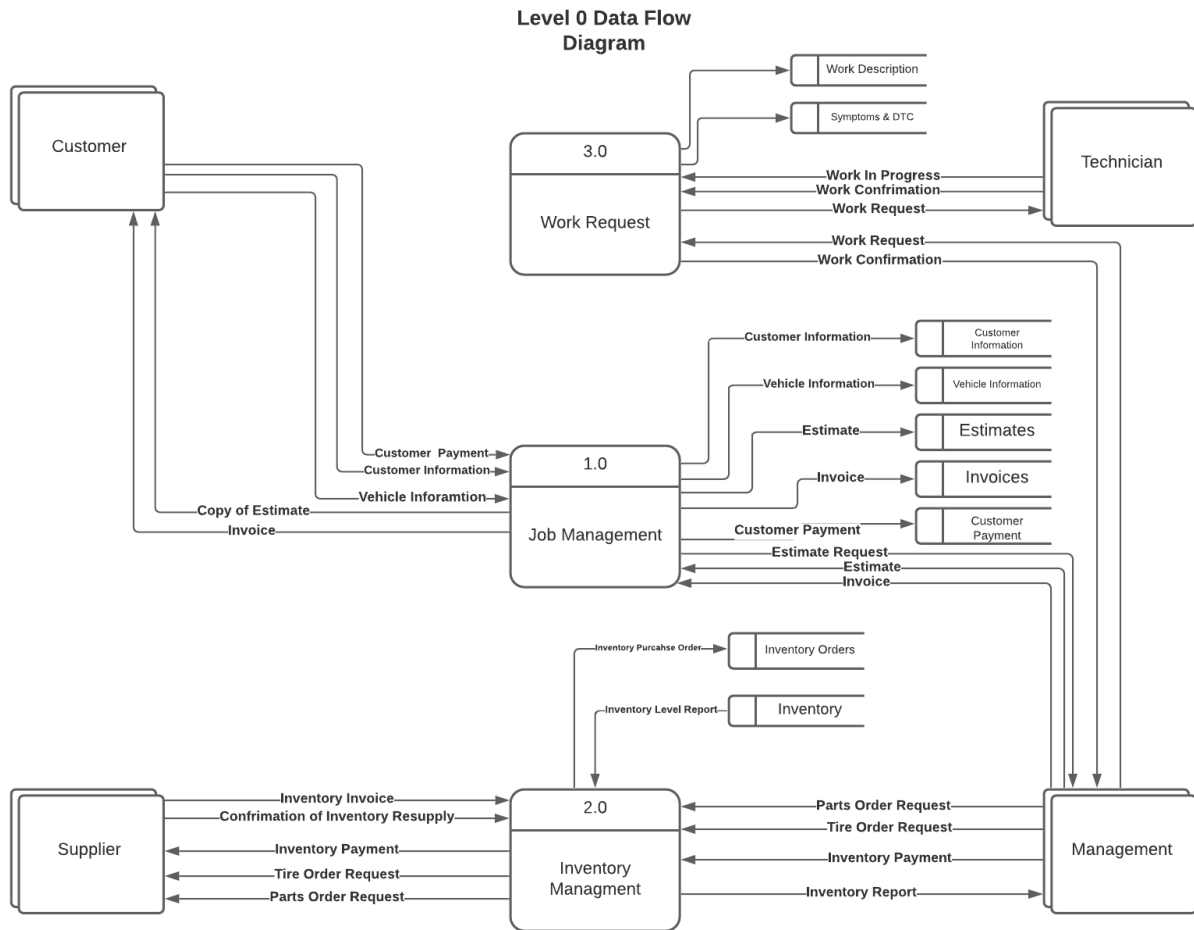- Work Request (a work assignment sent from Management)

To Management:

- Estimate Request (a request from customer for potential job)
- Inventory Report (update on inventory levels)
- Work Confirmation (job competition from technician)

Error Report:

Level 0 Diagram

Level 0 Data Flow Diagram

Ivan's Auto Repair: Level Zero Diagram

Data Stores

- **Customer Information**: This data store records the personal and car information for each client.
- **Estimates**: This data store contains the estimates of previous and inquired jobs.
- **Invoices**: This data store contains the invoices of jobs completed.
- **Customer Payment**: This data store maintains the financial payments of each client.
- **Work Description**: This data store contains the procedural records for each job.
- **Symptoms & DTC**: This data store maintains the diagnostic recorded by technicians.
- **Inventory Orders**: This data store maintains the history of orders for parts and tire.
- **Inventory**: This data store records the current inventory level for each parts.

Processes:

1. **Job Management**: This process manages front office administration. This includes the working face to face with clients, sending estimates and invoices to clients as well as reminders and incentives for future business.

Process Inputs:

- Customer Payment (payment received from Customer after job is fulfilled)
- Customer Information (personal and car information)
- Copy of Invoice (copy of invoice sent from Invoice Data Store)
- Copy of Estimate (copy of estimate sent from Estimate data store)
- Job Estimate and Invoice (Estimate and Invoices produced from Management)

Process Outputs:

- Copy of Estimate (copy of estimate sent to customer)
- Copy of Invoice (copy of invoice sent to customer)
- Estimate (estimates stored in the estimate data store)
- Invoice (invoices stored in the invoice data store)
- Customer Payment (customer finances for each job store in the Customer Payment data store.
- Estimate Request (request sent to management for estimate of potential job.

2. **Inventory Management**: This process involves the management of the current inventory levels and the acquisitions of new parts and tires.

Process Inputs

- Parts Order Request (order request from Management for parts)
- Tire Order Request (order request from Management for tires)
- Inventory level report (reports of the current inventory levels from the Inventory data store)
- Inventory Invoice (Invoice sent from supplier after order is fulfilled)
- Confirmation of Inventory Resupply (confirmation sent from supplier once the order is fulfilled)

Process Outputs

- Inventory Payment (payment sent to Suppliers for Inventory orders)
- Tire Order Request (order request to Supplier for tires)
- Parts Order Request (order request to Supplier for parts)
- Inventory Report (Inventory report sent Management)
- Inventory Purchase Order (history of inventory orders to Inventory data store)

3. **Work Request**: This process involves assignment of job to technicians to be completed and confirm completion to management.

Process Inputs

- Work Request (request for client job to be completed)
- Work Confirmation (confirmation sent from technician of completed job)
- Work In Progress (updates of job progress sent from technician)

Process Output

- Work Request (job assignment for technician)
- Work Confirmation (confirmation of completed job to Management)
- Work Description (procedural records for each job stored in the Work Description data store.
- Symptoms & DTC (diagnostic recorded by technicians stored in the Symptoms & DTC

Error Report:

Level 1 Diagram
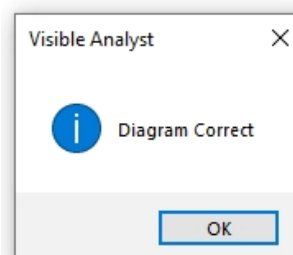
**Level 1 Job
Management
Diagram**

Level One Diagram Job Management

This diagram explores the Job Management Process. This process is responsible for front office administration with Customers. This process can be divided into two

Process 1.1 : Job Order Processing:

This process is responsible for processing customer information for estimates and sending customer notifications such as reminders and incentives.

Process Inputs:

From Customer

- Customer Information
- Vehicle Information

From Customer Information (data store)

- Contact Information

Process Outputs:

To Management

- Estimate Request

To Vehicle Information (data store)

- Vehicle Information

To Customer Information (data store)

- Customer Information

Process 1.2: Job Order Management

This process is responsible for creating estimates and invoices as well as managing customer payments.

Process Inputs:

From Customer

- Customer Payment

Form Management

- Estimate
- Invoice

Process Outputs:

To Customer

- Copy of Estimate
- Copy of Invoice

To Estimates (data store)

- Estimates

To Customer Payment (data store)

- Customer Payment

To Invoices (data store)

- Invoice

Error Report:

**Level 1 Inventory
Management
Diagram**
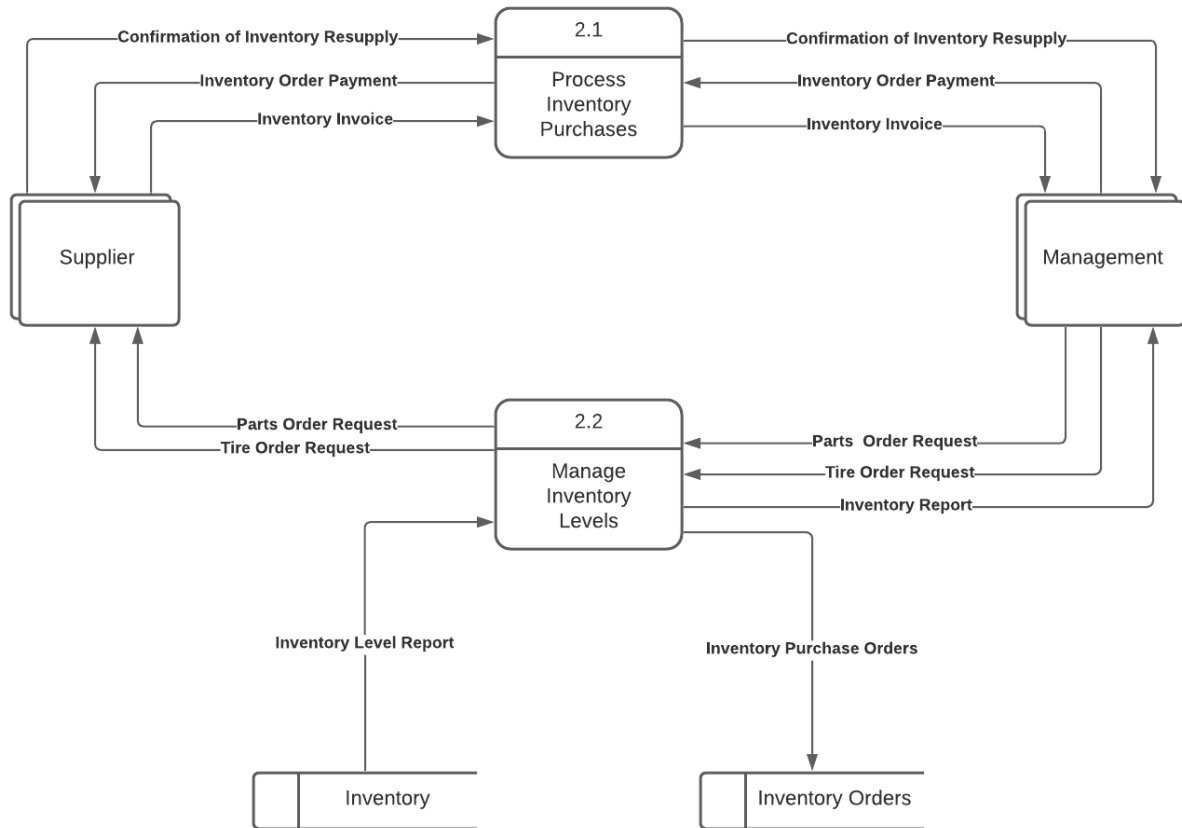
	2.1
	Process Inventory Purchases

Confirmation of Inventory Resupply

Inventory Order Payment

Inventory Invoice

Confirmation of Inventory Resupply

Inventory Order Payment

Inventory Invoice

Supplier

Management

Parts Order Request
Tire Order Request

	2.2
	Manage Inventory Levels

Parts Order Request
Tire Order Request
Inventory Report

Inventory Level Report

Inventory Purchase Orders

Inventory

Inventory Orders

Level One Inventory Management

This diagram explores the Inventory Management Process. This process is responsible for monitoring and purchasing inventory. This process can be divided into two processes. These processes are:

Process 2.1 Process Inventory Purchases

This process is responsible for managing the invoices and payments for inventory orders.

Process Inputs:

From Supplier

- Inventory Invoice

From Management

- Inventory Order Payment

Process Outputs:

To Supplier

- Inventory Order Payment

To Management

- Inventory Invoice
- Confirmation of Inventory Resupply

Process 2.2 Manage Inventory Levels

This process is responsible for submitting parts and tire orders as well as monitoring Inventory levels.

Process Inputs:

From Supplier

- Confirmation of Inventory Resupply

From Management

- Parts Order Request
- Tire Order Request

From Inventory (data store)

- Inventory Level Report

Process Outputs:

To Supplier

- Parts Order Request
- Tire Order Request

To Management

- Inventory Report

To Inventory Orders (data store)

- Inventory Purchase Orders

Error Report:
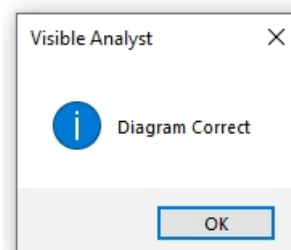
**Level 1 Work
Request Diagram**
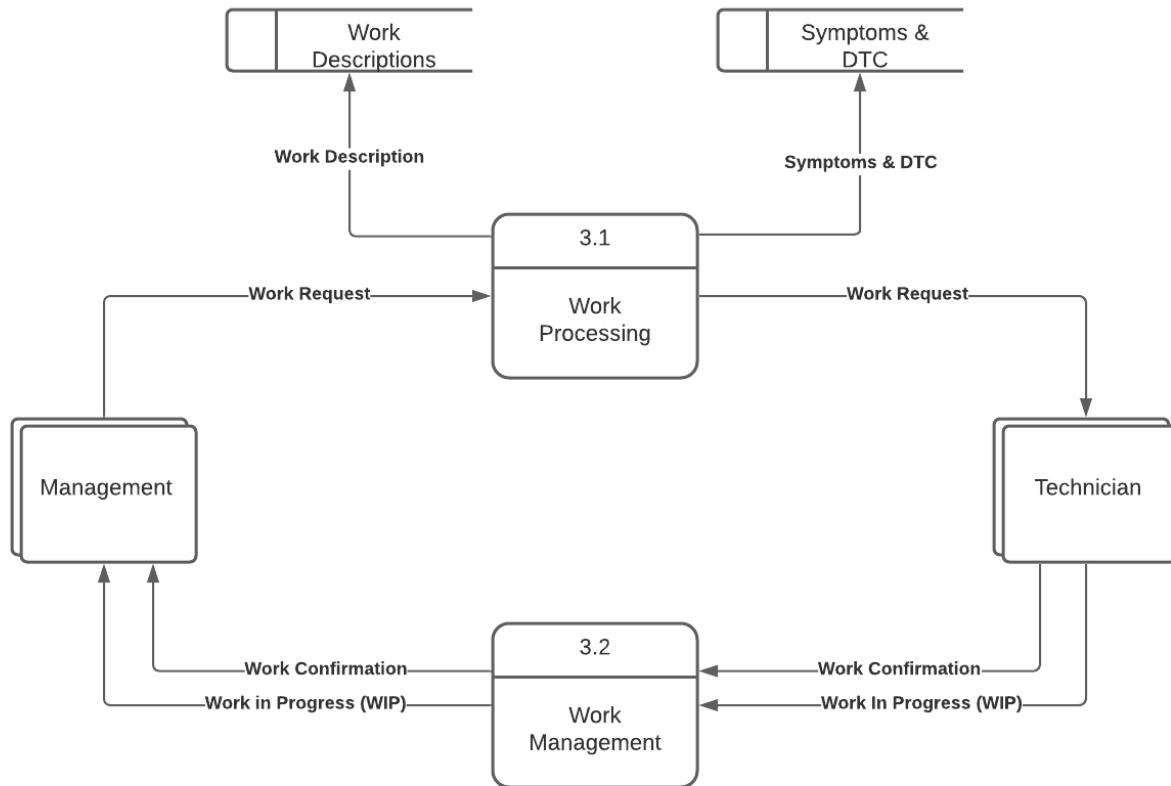
| | Work Descriptions | | | Symptoms & DTC |

Work Description

Symptoms & DTC

3.1

Work Processing

Work Request → Work Request

Management

Technician

3.2

Work Management

Work Confirmation

Work in Progress (WIP)

Work Confirmation

Work In Progress (WIP)

Level One Work Request

This diagram explores the Work Request Management Process. This process is responsible for managing the work orders that fulfilled by technicians. This process can be divided into two processes. These processes are:

Process 3.1 Work Processing

This process is responsible for assigning work orders to technicians and documenting the description and symptoms for each job.

Process Inputs:

From Management

- Work Request

Process Outputs:

To Work Descriptions (data store)

- Work Description

To Symptoms & DTC (data store)

- Symptoms & DTC

To Technician

- Work Request

Process 3.2 Work Management

This process is responsible for is for the work confirmations and work progress statuses between the Technicians and Management.

Process Inputs:

From Technician

- Work Confirmation
- Work In Progress (WIP)

Process Outputs:

To Management

- Work Confirmation
- Work in Progress (WIP)

Error Report:

Entity Relationship Diagram

Ivan's Auto Repair
ERD
By Team 1

Customer

PK	custLicense
	custLastName
	custFirstName
	custphone
	custaddress
	-custcity
	-custstate
	-custcountry
	-custpostCode
	carVin
	carMake
	carModel

Job Request

PK	JobID
	wodescription
	estimateDate
FK	custLicense

Management

PK	managerId
	managerName
	-managerFirstName
	-managerLastName

Work Order

PK	woID
	woDate
	woDescitpion
FK	mechId
FK	managerId

Requested By — Approved By — Placed By

Related to

Completed By

Checks

Technician

PK	mechId
	MechLastName
	MechFirstName

Submitted

Customer Payment

PK	paymentID
	paymentDate
	paymentAmount
FK	InvoiceID

Result From

Invoice

PK	invoiceID
	InvoiceDate
	invoicePayment
FK	JobID

Suppliers

PK	supplierId
	supplierEmail
	supplierPhone

Order From

Inventory Orders

PK	orderID
	orderDate
FK	supplierId

Create

Inventory

PK	partID
	partDescription
	partQuantity
	partPrice
FK	orderID

System Proposal Report

There are two sets of diagrams for the System Proposal Report. The first set is the Data Flow Diagrams for the proposed system along with the detailed narrative for the each entity, flow, data store, and process at each level. Additionally, each diagram includes the error report from testing it in Visible Analysis. The second set of diagrams is the Data Flow Diagrams for the physical system. This diagram takes into account the technology of the proposed system as well as the plan for implementation.

The entity relationship diagram contains all the keys and attributes stored in the proposed system. The diagram follows the logical data flow diagrams and also integrates the logical flow of the CRUD matrix.

System Models of Proposed System

Context Diagram

Ivan's Auto Repair: Context Diagram

External entities:

- **Customer**: This entity represents the clients of the auto body shop.
- **Supplier**: This entity represents any vendor that supplies Automobile parts and tires to the auto body shop.
- **Technician**: This entity represent the mechanics employed by the auto body shop.
- **Management**: This entity represent the front office of the body shop (specifically Ivan).

System Inputs:

From Customer:

- Customer Information (includes personal and car information)
- Customer Payment (payment from customer after job has been complete)

From Supplier:

- Inventory Order Confirmation (vendor sends confirmation form for parts and tires order)
- Inventory Invoice (invoice is sent after order is fulfilled)

From Technician:

- Work Confirmation (mechanic sends confirmation of completed work to management)
- Work Progress (mechanic sends work in progress to management)

From Management:

- Work Request (Management sends work request to Technician to begin to fulfill job)
- Inventory Order (Management sends order to supplier for parts and tires)
- Invoice (Management sends invoice to Customer once job is complete)
- Estimate (Management sends estimate to Customer for inquired jobs)

System Outputs

To Customer:

- Estimate (copy of estimate sent from Management)
- Invoice (invoice for job sent from Management after job is fulfilled)
- Customer Notifications (Reminders and Incentives sent from Management)

To Supplier:

- Parts Order(resupply request from Management for supply
- Tire Order (resupply request from Management for tire)
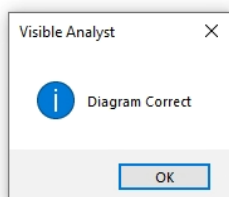- Inventory Payment (payment send to Suppliers for Parts and Tire Orders)

To Technician:

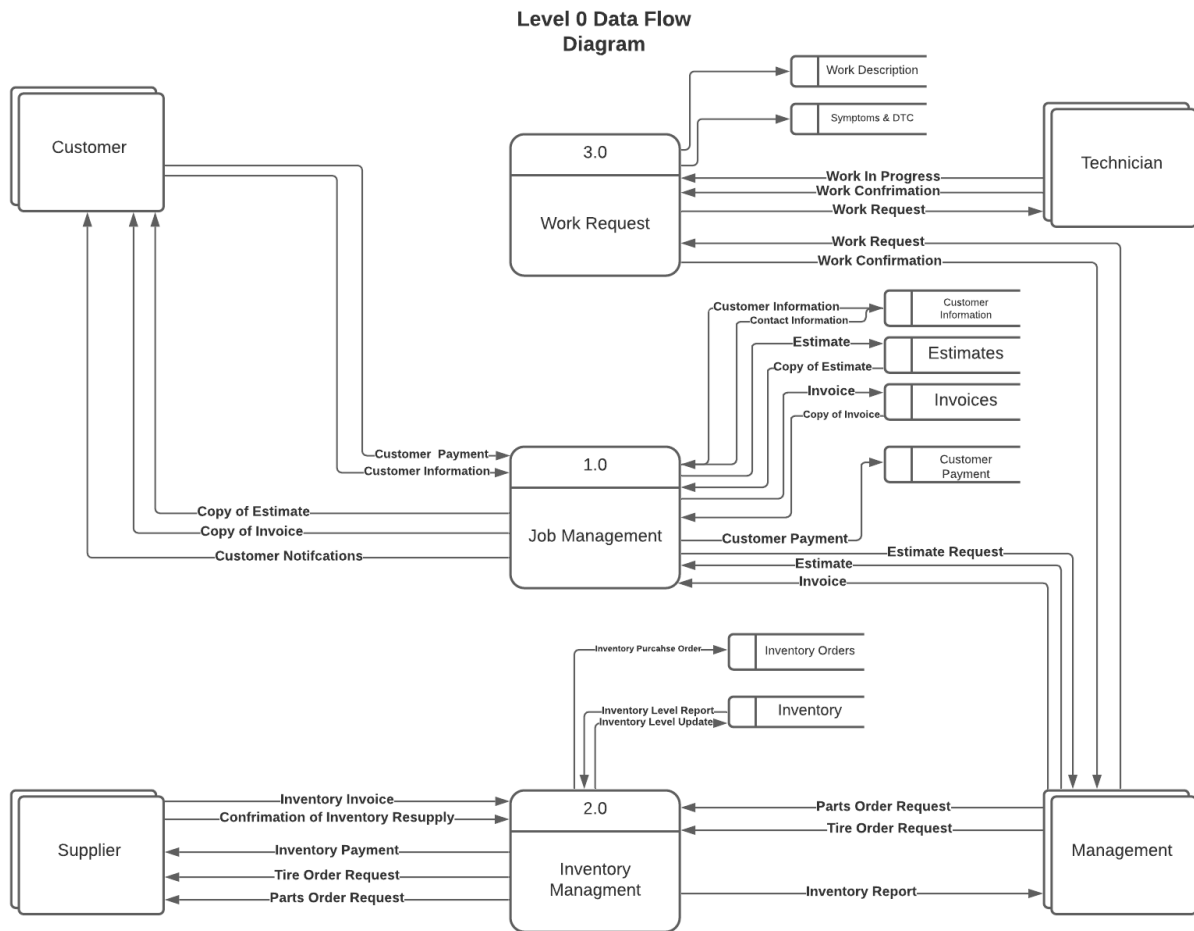- Work Request (a work assignment sent from Management)

To Management:

- Estimate Request (a request from customer for potential job)
- Inventory Report (update from Inventory data store)
- Work Confirmation (notification of work completion from technician

Error Report:

Level 0 Diagram

Level 0 Data Flow Diagram

Ivan's Auto Repair: Level Zero Diagram

Data Stores

- **Customer Information**: This data store records the personal and car information for each client.
- **Estimates**: This data store contains the estimates of previous and inquired jobs.
- **Invoices**: This data store contains the invoices of jobs completed.
- **Customer Payment**: This data store maintains the financial payments of each client.
- **Work Description**: This data store contains the procedural records for each job.
- **Symptoms & DTC**: This data store maintains the diagnostic recorded by technicians.
- **Inventory Orders**: This data store maintains the history of orders for parts and tire.
- Inventory: This data store records the current inventory level for each parts.

Processes:

2. **Job Management**: This process manages front office administration. This includes the working face to face with clients, sending estimates and invoices to clients as well as reminders and incentives for future business.

Process Inputs:

- Customer Payment (payment received from Customer after job is fulfilled)
- Customer Information (personal and car information)
- Copy of Invoice (copy of invoice sent from Invoice Data Store)
- Copy of Estimate (copy of estimate sent from Estimate data store)
- Job Estimate and Invoice (Estimate and Invoices produced from Management)
- Contact Information (Contact information pulled from customer information data store for reminders and incentives)

Process Outputs:

- Copy of Estimate (copy of estimate sent to customer)
- Copy of Invoice (copy of invoice sent to customer)
- Customer Notifications
- Estimate (estimates stored in the estimate data store)
- Invoice (invoices stored in the invoice data store)
- Customer Payment (customer finances for each job store in the Customer Payment data store.
- Estimate Request (request sent to management for estimate of potential job.

2. **Inventory Management**: This process involves the management of the current inventory levels and the acquisitions of new parts and tires.

Process Inputs

- Parts Order Request (order request from Management for parts)
- Tire Order Request (order request from Management for tires)
- Inventory level report (reports of the current inventory levels from the Inventory data store)
- Inventory Invoice (Invoice sent from supplier after order is fulfilled)
- Confirmation of Inventory Resupply (confirmation sent from supplier once the order is fulfilled)

Process Outputs

- Inventory Payment (payment sent to Suppliers for Inventory orders)
- Tire Order Request (order request to Supplier for tires)
- Parts Order Request (order request to Supplier for parts)
- Inventory Report (Inventory report sent Management)
- Inventory Purchase Order (history of inventory orders to Inventory data store)
- Inventory Level Update (updates of inventory levels to inventory data store)

4. **Work Request**: This process involves assignment of job to technicians to be completed and confirm completion to management.

Process Inputs

- Work Request (request for client job to be completed)
- Work Confirmation (confirmation sent from technician of completed job)
- Work In Progress (updates of job progress sent from technician)

Process Output

- Work Request (job assignment for technician)
- Work Confirmation (confirmation of completed job to Management)
- Work Description (procedural records for each job stored in the Work Description data store.
- Symptoms & DTC (diagnostic recorded by technicians stored in the Symptoms & DTC

Error Report:
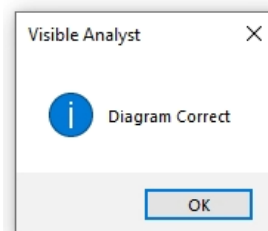
Level 1 Diagram: Job Management
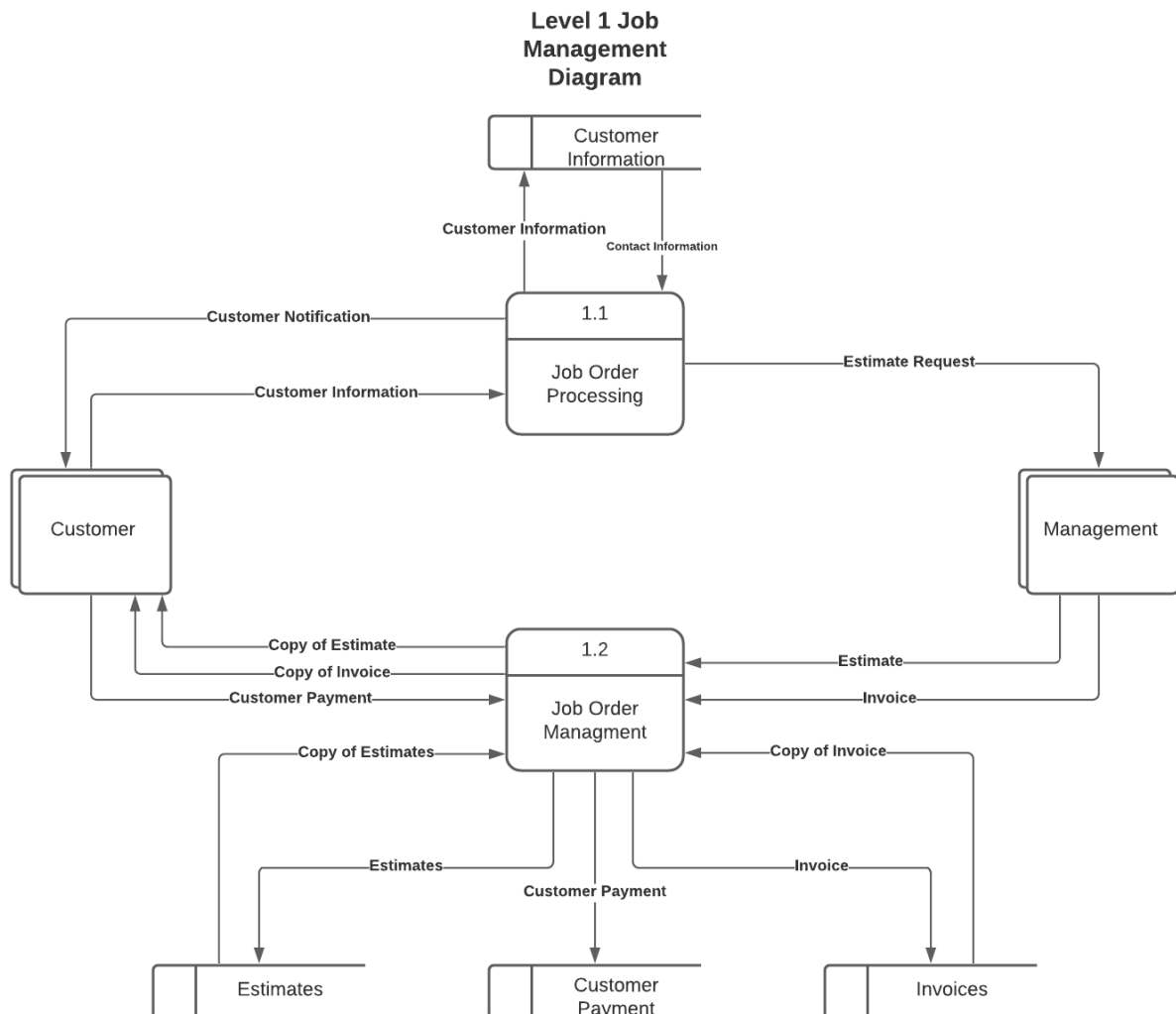
**Level 1 Job
Management
Diagram**

Customer
Information

Customer Information

Contact Information

Customer Notification

1.1

Job Order
Processing

Customer Information

Estimate Request

Customer

Management

Copy of Estimate

Copy of Invoice

Customer Payment

1.2

Job Order
Managment

Estimate

Invoice

Copy of Estimates

Copy of Invoice

Estimates

Invoice

Customer Payment

Estimates

Customer
Payment

Invoices

Level One Diagram Job Management

This diagram explores the Job Management Process. This process is responsible for front office administration with Customers. This process can be divided into two processes. These processes are:

Process 1.1 : Job Order Processing:

This process is responsible for processing customer information for estimates and sending customer notifications such as reminders and incentives.

Process Inputs:

From Customer

- Customer Information
- Vehicle Information

From Customer Information (data store)

- Contact Information

Process Outputs:

To Customer

- Customer Notification

To Management

- Estimate Request

To Vehicle Information (data store)

- Vehicle Information

To Customer Information (data store)

- Customer Information

Process 1.2: Job Order Management

This process is responsible for creating estimates and invoices as well as managing customer payments.

Process Inputs:

From Customer

- Customer Payment

Form Management

- Estimate
- Invoice

From Estimates (data store)

- Copy of Estimates

From Invoices (data store)

- Copy of Invoice

Process Outputs:

To Customer

- Copy of Estimate
- Copy of Invoice

To Estimates (data store)

- Estimates

To Customer Payment (data store)

- Customer Payment

To Invoices (data store)

- Invoice

Error Report:

Visible Analyst

Diagram Correct

OK
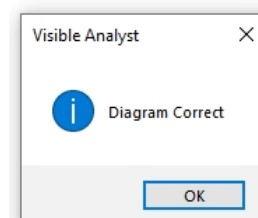
Level 1 Diagram: Inventory Management
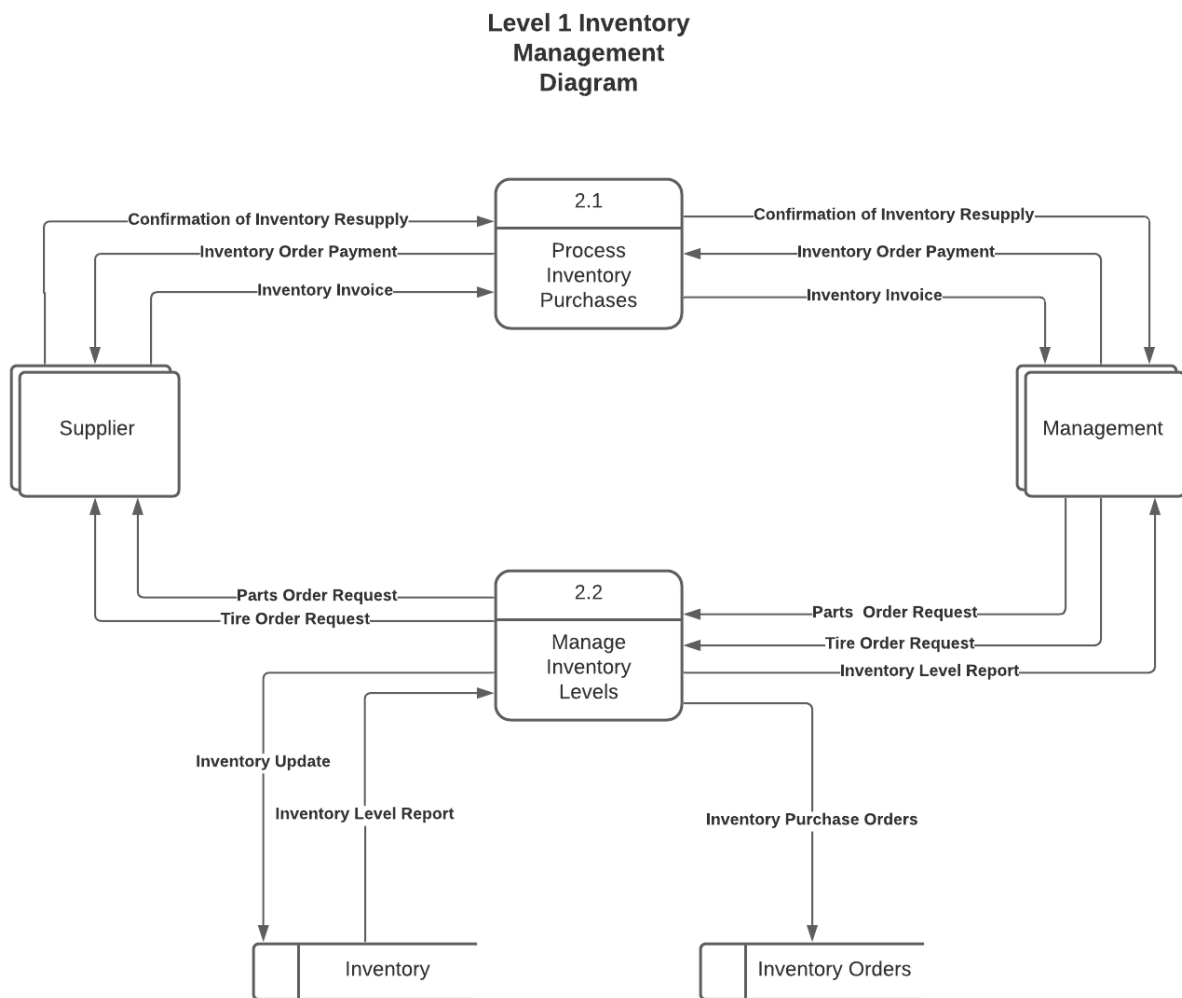
Level 1 Inventory Management Diagram

Level One Inventory Management

This diagram explores the Inventory Management Process. This process is responsible for monitoring and purchasing inventory. This process can be divided into two processes.

Process 2.1 Process Inventory Purchases

This process is responsible for managing the invoices and payments for inventory orders.

Process Inputs:

From Supplier

- Inventory Invoice

From Management

- Inventory Order Payment

Process Outputs:

To Supplier

- Inventory Order Payment

To Management

- Inventory Invoice

Error Report:
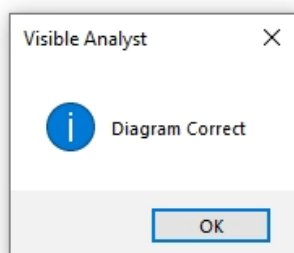
Process 2.2 Manage Inventory Levels

This process is responsible for submitting parts and tire orders as well as monitoring Inventory levels.

Process Inputs:

From Supplier

- Confirmation of Inventory Resupply

From Management

- Parts Order Request
- Tire Order Request

From Inventory (data store)

- Inventory Level Report

Process Outputs:

To Supplier

- Parts Order Request
- Tire Order Request

To Management

- Confirmation of Inventory Resupply

To Inventory (data store)

- Inventory Update

To Inventory Orders (data store)

- Inventory Purchase Orders

Level 1 Diagram: Work Request
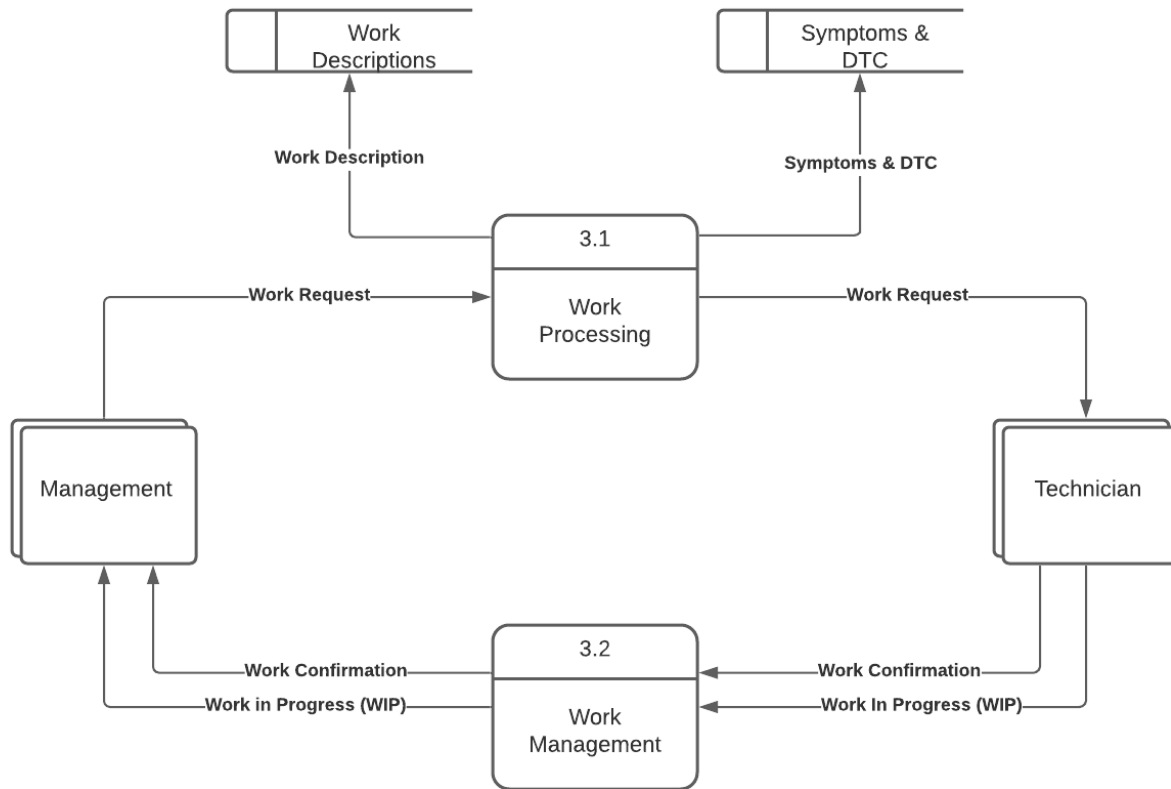
Work Descriptions

Symptoms & DTC

Work Description

Symptoms & DTC

3.1

Work Processing

Work Request

Work Request

Management

Technician

3.2

Work Management

Work Confirmation

Work in Progress (WIP)

Work Confirmation

Work In Progress (WIP)

Level One Work Request

This diagram explores the Work Request Management Process. This process is responsible for managing the work orders that fulfilled by technicians. This process can be divided into two processes. These processes are:

Process 3.1 Work Processing

This process is responsible for assigning work orders to technicians and documenting the description and symptoms for each job.

Process Inputs:

From Management

- Work Request

Process Outputs:

To Work Descriptions (data store)

- Work Description

To Symptoms & DTC (data store)

- Symptoms & DTC

To Technician

- Work Order

Error Report:

Process 3.2 Work Management

This process is responsible for is for the work confirmations and work progress statuses between the Technicians and Management.

Process Inputs:

From Technician

- Work Confirmation
- Work In Progress (WIP)

Process Outputs:

To Management

- Work Confirmation
- Work in Progress (WIP)

Entity Relationship Diagram

Ivan's Auto Repair
ERD
By Team 1

Customer

PK	custLicense
	custLastName
	custFirstName
	custphone
	custaddress
	-custcity
	-custstate
	-custcountry
	-custpostCode
	carVin
	carMake
	carModel

Job Request

PK	JobID
	wodescription
	estimateDate
FK	custLicense

Management

PK	managerId
	managerName
	-managerFirstName
	-managerLastName

Work Order

PK	woID
	woDate
	woDescitpion
FK	mechId
FK	managerId

Technician

PK	mechId
	MechLastName
	MechFirstName

Customer Payment

PK	paymentID
	paymentDate
	paymentAmount
FK	InvoiceID

Invoice

PK	invoiceID
	InvoiceDate
	invoicePayment
FK	JobID

Inventory

PK	partID
	partDescription
	partQuantity
	partPrice
FK	orderID

Suppliers

PK	supplierId
	supplierEmail
	supplierPhone

Inventory Orders

PK	orderID
	orderDate
FK	supplierId

Requested By · Approved By · Placed By · Related to · Submitted · Result From · Checks · Completed By · Order From · Create

Synchronized System Models

Entity / Attribute	C1	C2	C3	C4	C5	C6	C7	C8	C9
Customer	CRUD			CRUD					
.custLicense	CRUD			CRUD					
.custLastName	CRUD			CRUD					
.custFirstName	CRUD			CRUD					
.custphone	CRUD			CRUD					
.custaddress	CRUD			CRUD					
.custcity	CRUD			CRUD					
.custstate	CRUD			CRUD					
.custcountry	CRUD			CRUD					
.custPostcode	CRUD			CRUD					
.carVin	CRUD			CRUD					
.carMake	CRUD			CRUD					
.carModel	CRUD			CRUD					
Customer Payment	CU			CU					
.paymentID	CU			CU					
.paymentDate	CU			CU					
.paymentAmount	CU			CU					
.InvoiceID	CU			CU					
.custLicense	CU			CU					
Invoice	CRU			CRU					
.invoiceID	CRU			CRU					
.invoiceDate	CRU			CRU					
.invoicePayment	CRU			CRU					
.JobID	CRU			CRU					
Job Request	CRU			CRU					
.JobID	CRU			CRU					
.woDescription	CRU			CRU					
.estimatedate	CRU			CRU					
.custLicense	CRU			CRU					
Management	R	R	R	R	R	R	R	R	R
.managerID	R	R	R	R	R	R	R	R	R
.managerName	R	R	R	R	R	R	R	R	R
.managerFirstName	R	R	R	R	R	R	R	R	R
.managerLastName	R	R	R	R	R	R	R	R	R
Work Order	CU		CUD	CRU			CUD		
.woID	CU		CUD	CRU			CUD		
.woDate	CU		CUD	CRU			CUD		
.woDescription	CU		CUD	CRU			CUD		
.mechID	CU		CUD	CRU			CUD		
.managerID	CU		CUD	CRU			CUD		

Entity / Attribute	C1	C2	C3	C4	C5	C6	C7	C8	C9
Technician			R					R	R
.mechID			R					R	R
.mechName			R					R	R
Inventory	CRUD						CRUD		
.partID	CRUD						CRUD		
.partDescription	CRUD						CRUD		
.partQuantity	CRUD						CRUD		
.partPrice	CRUD						CRUD		
.orderID	CRUD						CRUD		
Inventory Orders	CRUD					R	CUD		
.OrderID	CRUD					R	CUD		
.orderDate	CRUD					R	CUD		
.supplierID	CRUD					R	CUD		
Suppliers	R					R	R		
.supplierID	R					R	R		
.supplierEmail	R					R	R		
.supplierPhone	R					R	R		

The Physical System Design

Candidate System Solutions Matrix

Characteristics	Candidate 1 (QuickBooks)	Candidate 2 (Custom)	Candidate 3 (SalesForce)
Portion of System Computerized	This COTS solution would be purchased and customized to satisfy required functionality	New Inventory management will be added that allows access to all inventory including tires.	Saas product will be Purchased to use inventory management system
Benefits	Can be implemented quickly because it is a COTS solution	More inventory will be able to be viewed without having to go through third party sites.	Supports user required business processes
Servers and Workstations	- Windows Server 2019, Standard and Essentials - Windows Server 2016, Standard and Essentials - Windows Server 2012 R2, Standard and Essentials - Windows Server 2012, Standard and Essentials - Windows 10 - Windows 8.1	- Local office computers will run the software - Even additional devices like ipads, ipods, macbooks - Devices could be used by owner, mechanics, and customers - Mac computer with macOS Mojave	- Standard User Desktop with an Internet connection - Windows 2.33Gz with a faster processor in order to use client application such as chatter
Software Tools Needed	Quickbooks Application	We would use Kintone to create our own personal database	Salesforce for outlook
Application Software	Quickbooks Advanced Package	Orders, Invoices, Inventory, and payments will all be processed in real time.	Chatter Desktop
Method of Data Processing	Keyboard/Mouse	Keyboard/Mouse	KeyBoard/Mouse
Output Devices and Implications	MS SQL Server DBMS with 100GB arrayed capability.	3.0GHz 10-core Intel Xeon W processor	10GB of file storage

		- Turbo Boost up to 4.5Ghz 32GB 2666MHz ECC memory, configurable up to 256GB 1TB SSD storage - Radeon Pro Vega 56 with 8GB HBM2 memory 10Gb Ethernet	

Feasibility Analysis Matrix

Feasibility Criteria	Wt.	Candidate 1 QuickBooks	Candidate 2 Custom	Candidate 3 Sales Force
Operational Feasibility	30%	Quickbooks will enable Ivan's Autoshop to use an all in one system that can accomplish multiple business transactions The solution may not be as well received as it is more costly a solution than what was originally stated. Quickbooks may also require a learning curve for the user to overcome to be utilized properly **SCORE: 88**	The new system would benefit the organization by adding more sources that are within the business. The system would work smoother and much easier compared to having to work with a third party company and getting permission to access certain things in the system. The system would help the manager in having easier access to his parts and automated communication already set with his customers. **Score: 100**	Salesforce will give Ivan's Autoshop an all in one system that can accomplish multiple business transactions The solution may not be as well received as it is more costly a solution than what was originally stated. The candidate may also require a learning curve for the user to overcome to properly utilize the candidate. **Score: 60**
Technical Feasibility	40%	Quickbooks is easy to use and simply requires one time payments, and/or yearly subscription fees to keep up to date on the latest editions. However, according to online reviews, can be prone to small bugs where customer support is not always able to assist with the issue. **SCORE: 80**	Creating our own system through Kintone would be more flexible and unique to our own company. The use of apple products would create a more organized, clear atmosphere. Kintone helps businesses/teams build, share, and automate custom workflows and processes for data-driven results. **Score: 95**	Salesforce is a technology that does not require much infrastructure, as long as the user has a desktop with a decent amount of storage as well as internet connection they should be able to utilize the technology. **Score:70**

Economic Feasibility Cost to Develop: Payback Period: Net Present Value: Detailed Calculations	20%	Cost to Develop: $900 Annual Approx. $75/month NPV: $209,392.04 Calculations: See below **SCORE: 70**	$11,292.88 < 1 Year $251,364.65 **Score: 85**	Cost to develop: Approx. 1800$ Annual 150/month **Score: 70**
Schedule Feasibility	10%	Less than a week **SCORE: 100**	6 months at most **Score: 85**	Less than a week **Score:100**
Ranking	100%	**82.4**	**93.5**	**70**

Weight Rationale

Technical Feasibility

 a. Weight 40%
 b. This category is weighted the highest because our client does not run a large operation and does not have IT staff on hand, so we wanted to prioritize technology that is easy to understand and simple to use. We also wanted the technology to be relatively low maintenance so our client would have to pay more fees associated with the system, so it would not be a hindrance to the business.

Operational Feasibility

 a. Weight 30%
 b. This is second on the list of importance because one of the main purposes of the new system is to improve efficiency. So if the candidate chosen is not an improvement operationally from the old system, then we did not do our job

Economic Feasibility

 a. Weight 20%
 b. This is third on the list of importance because this is not a major investment to the client. The solution that we choose is not expected to either save or lose the client money, however the solution can't be increasingly costly to the client

Schedule Feasibility

 a. Weight 10%

b. This is last on the list of importance because there is no hurry to implement this solution, although the candidate can prove very valuable to the client, it is not needed to run the clients day to day operations

Custom Solution (Kintone with Apple Hardware)

DEVELOPMENT COSTS:

Hardware and Software Costs:

Macbook Pros (3), Mac desktop (1) with MacOS Server Software: $8896.00

Subscription with Kintone: $24.99 / month ($299.88 annually)

Ipads (3) , Ipods (5): $1797.00

Total Hardware and Software Costs: $10,992.88

Personnel Costs:

Programming Costs (): N/A

Employee Training Time ($15/hr) = 5 hrs for 4 employees = $300

Total Personnel Costs: $300.00

Total Development Costs: $11,292.88

PROJECTED ANNUAL OPERATING COSTS:

Expenses:

Expert Assistance: (20hrs at $50/hr): $1,000.00

Programmer/Analyst: (30hrs at $50/hr): $1,500.00

Total Expenses: $2,500.00

Total Projected Annual Costs: $ 2,500.00

BENEFITS OF A CUSTOM SYSTEM:

Benefits of the Recommended Custom Solution:

Cost Savings:

Inventory Management Time Efficiency Savings: $500.00

Checkout Process Efficiency Improvement Savings: $1,000.00

Reduced Billing Errors: $8,000.00

Total Annual Cost Savings: $9,500.00

Increased Sales:

Increased Sales (12%) from Improved Business Processes: $22,000.00

Increased Annual Sales from web store: (10%): $30,000.00

Total Annual Increase in Sales: $52,000.00

Projected Annual Benefits: $61,500.00

Payback Analysis

Cash Flow Description:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	($11,292.88)					
Annual Cost:		**($2,500.00)**	**($2,500.00)**	**($2,500.00)**	**($2,500.00)**	**($2,500.00)**
Time Adjusted Costs (4%):	($11,292.88)	($2,403.85)	($2,311.39)	($2,222.49)	($2,137.01)	($2,054.82)
Cumulative Adjusted Costs:	($11,292.88)	($13,696.73)	($16,008.12)	($18,230.61)	($20,367.62)	($22,422.44)
Benefits Derived From New System	$0.00	**$61,500.00**	**$61,500.00**	**$61,500.00**	**$61,500.00**	**$61,500.00**
Time Adjusted Benefits:	$0.00	$59,134.62	$56,860.21	$54,673.28	$52,570.46	$50,548.52
Cumulative Adjusted Benefits:	$0.00	$59,134.62	$115,994.83	$170,668.11	$223,238.57	$273,787.09
Cumulative Lifetime costs+benefits:	($11,292.88)	$45,437.89	$99,986.71	$152,437.50	$202,870.95	$251,364.65

Payback Analysis For Custom Solution

■ Dollars


```
300,000.00 ─

200,000.00 ─

100,000.00 ─

      0.00 ─

-100,000.00 ─
          Year 0   Year 1   Year 2   Year 3   Year 4   Year 5
```
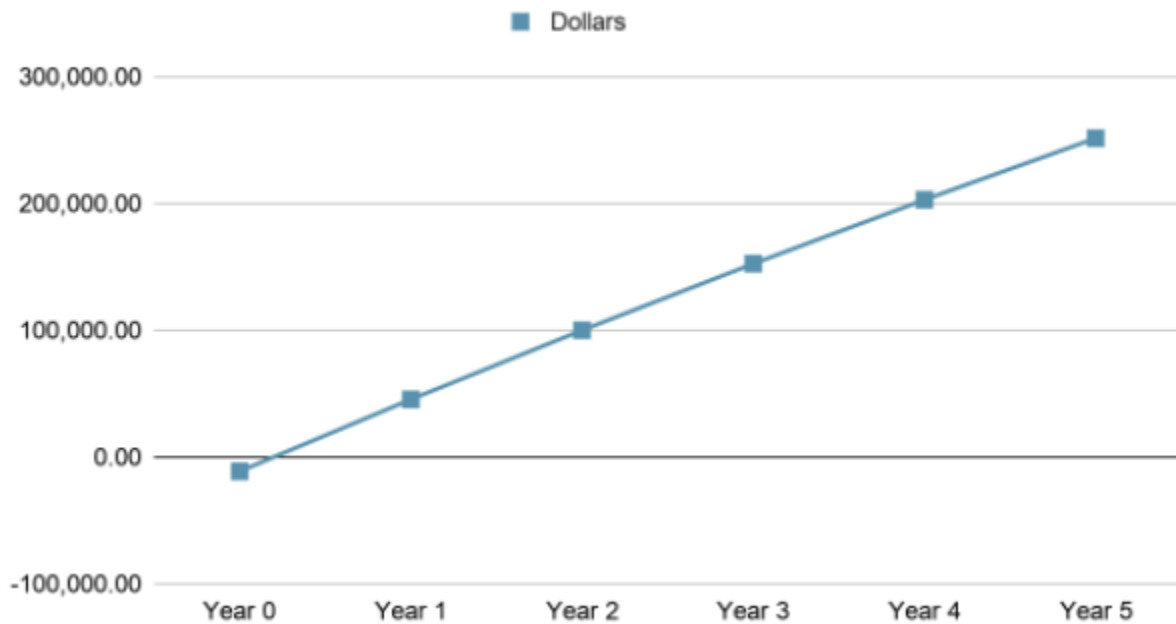
NPV Analysis:
Total Present Value of Lifetime Costs: ($22,422.44)
Total Present Value of Lifetime Benefits: $273,787.09
Net Present Value of this Alternative: $251,364.65

QuickBooks

DEVELOPMENT COSTS:

Hardware and Software Costs:

Quickbooks Advanced Edition: **$900.00**

Quickbooks Point of Sale Software: **$1,499.95**

Quickbooks POS Hardware (BarCode Scanner): **$199.95**

Merchant Service for Web Stores: **$59.95**

Total Hardware and Software Costs: **$2,659.85**

Personnel Costs:

Programming Costs (): N/A

Employee Training Time ($15/hr) = 5 hrs for 4 employees = $300

Total Personnel Costs: $300.00

Total Development Costs: $2,959.85

PROJECTED ANNUAL OPERATING COSTS:

Expenses:

Expert Assistance: (20hrs at $50/hr): $1,000.00

Programmer/Analyst: (30hrs at $50/hr): $1,500.00

Total Expenses: $2,500.00

Total Projected Annual Costs: $2,500.00

BENEFITS OF QUICKBOOKS

Cost Savings:

Inventory Management Time Efficiency Savings: $700

Checkout Process Efficiency Improvement Savings: $1,000

Reduced Billing Errors: $7,500

Total Annual Cost Savings: $9,200

Increased Sales:

Increased Sales (8%) from Improved Business Processes: $14,000

Increased Annual Sales from web store: (9%): $27,000.00

Total Annual Increase in Sales: $41,000.00

Project Annual Benefits: $50,200.00

Payback Analysis

Cash Flow Description:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	($2,959.85)					
Annual Cost:		**($2,500)**	**($2,500)**	**($2,500)**	**($2,500)**	**($2,500)**
Time Adjusted Costs ():	($2,959.85)	($2,403.82)	($2,311.39)	($2,222.49)	($2,137.01)	($2,054.82)
Cumulative Adjusted Costs:	($2,959.85)	($5,363.70)	($7,675.09)	($9897.58)	($12,034.59)	($14,089.41)
Benefits Derived From New System	$0.00	**$50,200.00**	**$50,200.00**	**$50,200.00**	**$50,200.00**	**$50,200.00**
Time Adjusted Benefits:	$0.00	$48,269.21	$46,412.74	$44,627.58	$42,911.17	$41,260.75
Cumulative Adjusted Benefits:	$0.00	$48,269.21	$94,681.95	$139,309.53	$182,220.7	$223,481.45
Cumulative Lifetime costs+benefits:	($2,959.85)	$42,905.51	$87,006.86	$129,411.95	$170,186.11	$209,392.04

Payback Analysis for Quickbooks
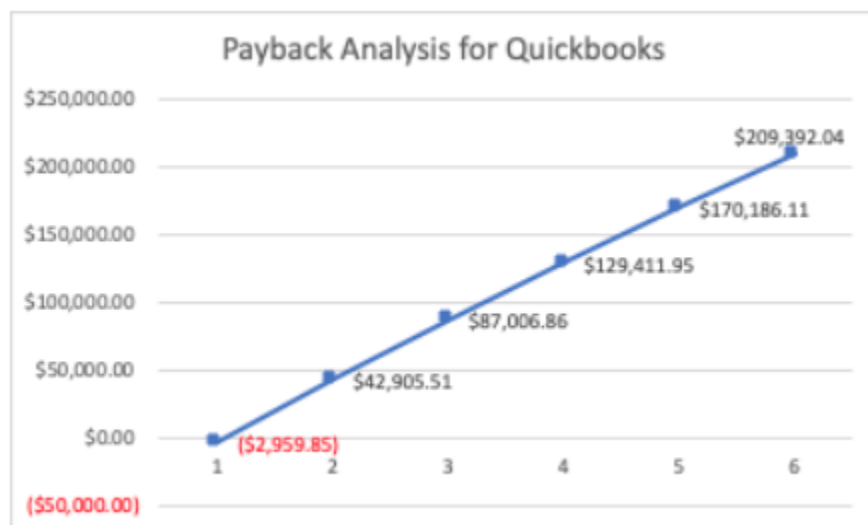
> ## NPV Analysis:
> Total Present Value of Lifetime Costs: ($14,089.41)
> Total Present Value of Lifetime Benefits: $223,481.45
> **Net Present Value of this Alternative:** $209,392.04

Sales Force

DEVELOPMENT COSTS:

Hardware and Software Costs:

SalesForce SalesCloud Enterprise (per user): **$1800.00**

Salesforce Service Cloud Enterprise (per user): **$1800.00**

Total Hardware and Software Costs: **$3600.00**

Personnel Costs:

Programming Costs (): N/A

Employee Training Time ($15/hr) = 5 hrs for 4 employees = $300

Total Personnel Costs: **$300**

Total Development Costs: $3900.00

PROJECTED ANNUAL OPERATING COSTS:

Expenses:

Expert Assistance: Salesforce consultant: $75 Hour (10hrs)

Programmer/Analyst: (30hrs at $50/hr): $1,500.00

Total Expenses: **$750.00**

Total Projected Annual Costs: $4650.00

BENEFITS OF A CUSTOM SYSTEM:

Benefits of the Recommended Custom Solution:

Cost Savings: **$600**

Inventory Management Time Efficiency Savings:

Checkout Process Efficiency Improvement Savings: **$800**

Reduced Billing Errors: **$5000**

Total Annual Cost Savings:$6400

Increased Sales:

Increased Sales from..**$8000**

Increased Annual Sales from...**$15000**

Total Annual Increase in Sales:$23000

Project Annual Benefits: $29400

Payback Analysis

Cash Flow Description:	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Cost:	**$3,600**					
Annual Cost:		**($2,250)**	**($2,250)**	**($2,250)**	**($2,250)**	**($2,250)**
Time Adjusted Costs ():	($3,600.00)	($2,160)	($2,073)	($1,990)	($1,910)	($1834)
Cumulative Adjusted Costs:	($3,600.00)	($6290.68)	($8406.35)	($9856.34)	($11,245.75)	($13,145.83)
Benefits Derived From New System	$0.00	**$29400**	**$29400**	**$29400**	**$29400**	**$29400**
Time Adjusted Benefits:	$0.00	$27,884.62	$25789.90	$22919.13	$19591.36	$16746.78
Cumulative Adjusted Benefits:	$0.00	$27,884.62	$54696.75	$105266.98	$160249.67	$190282.47
Cumulative Lifetime costs+benefits:	($3600.00)	$21593.94	$46290.40	$95341.64	$149003.92	$177136.64

Payback Analysis for Salesforce
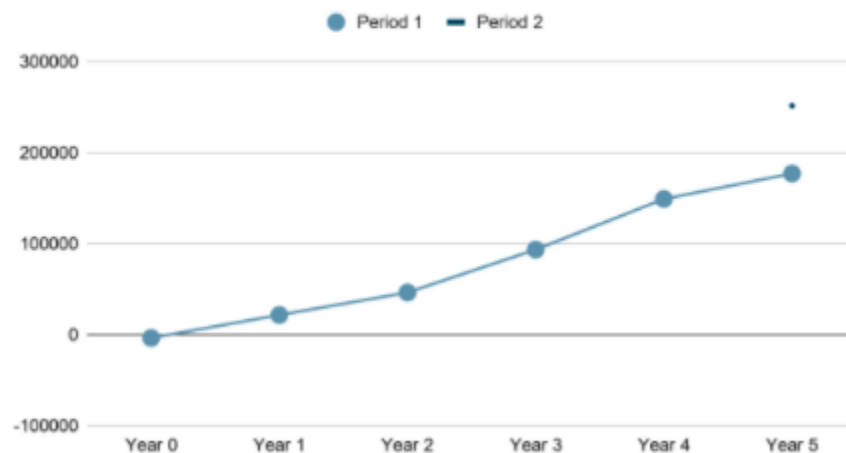
NPV Analysis:

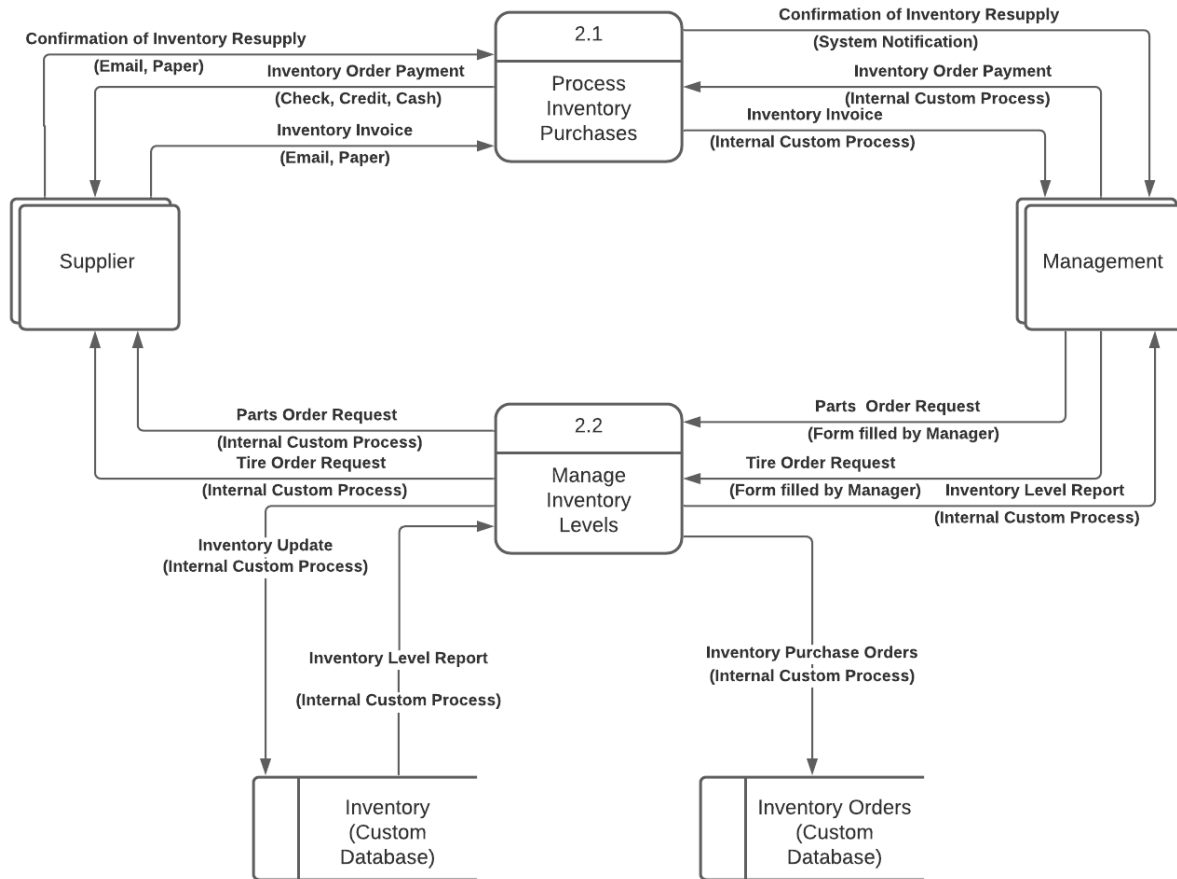Total Present Value of Lifetime Costs:($13,145.83)

Total Present Value of Lifetime Benefits:$190,282.47
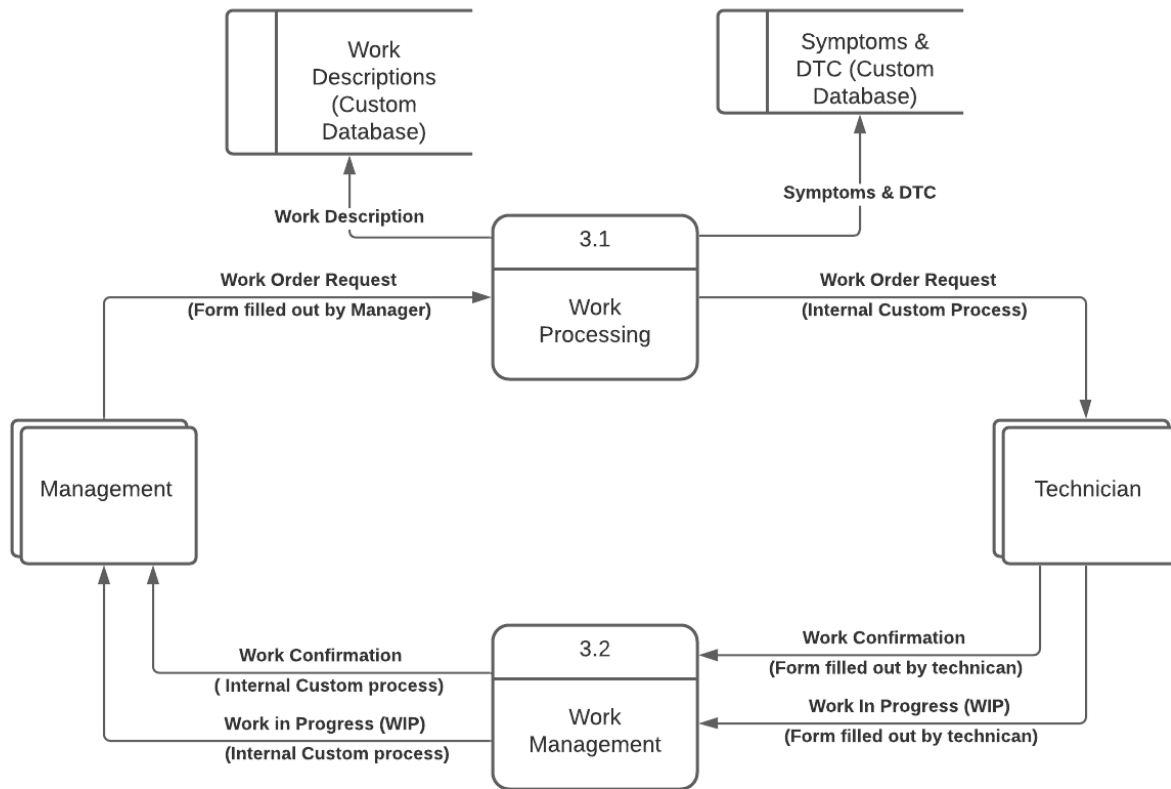
Net Present Value of this Alternative: $17,7136

Physical DFD

Level 1 Job Management Diagram

Customer Information (Custom Database)

Customer Information

Contact Information

1.1 Job Order Processing

Customer Notification (Email)

Customer Information (Paper, Online Form)

Estimate Request (System Notifcation)

Customer

Management

Copy of Estimate (Paper, Email)

Copy of Invoice (Paper, Email)

Customer Payment (Credit, Cash, Check)

Copy of Estimates

1.2 Job Order Managment

Estimate (Internal Custom Process)

Invoice (Internal Custom Process)

Copy of Invoice (Internal Custom Process)

Estimates (Internal Custom Process)

Customer Payment (Internal Custom Process)

Invoice (Internal Custom Process)

Estimates (Custom Database)

Customer Payment (Custom Database)

Invoices (Custom Database)

**Level 1 Inventory
Management
Diagram**

**Level 1 Work Request
Diagram**

Work
Descriptions
(Custom
Database)

Symptoms &
DTC (Custom
Database)

Work Description

Symptoms & DTC

3.1

Work
Processing

Work Order Request

(Form filled out by Manager)

Work Order Request

(Internal Custom Process)

Management

Technician

Work Confirmation

(Form filled out by technican)

3.2

Work Confirmation

(Internal Custom process)

Work
Management

Work in Progress (WIP)

(Internal Custom process)

Work In Progress (WIP)

(Form filled out by technican)

Sample Interface Screens

Invoice Input

Adjust Inventory Quantity

Estimate Input

Giving Customer a Delayed Charge

Sample Outputs

Dashboard with Summary Information
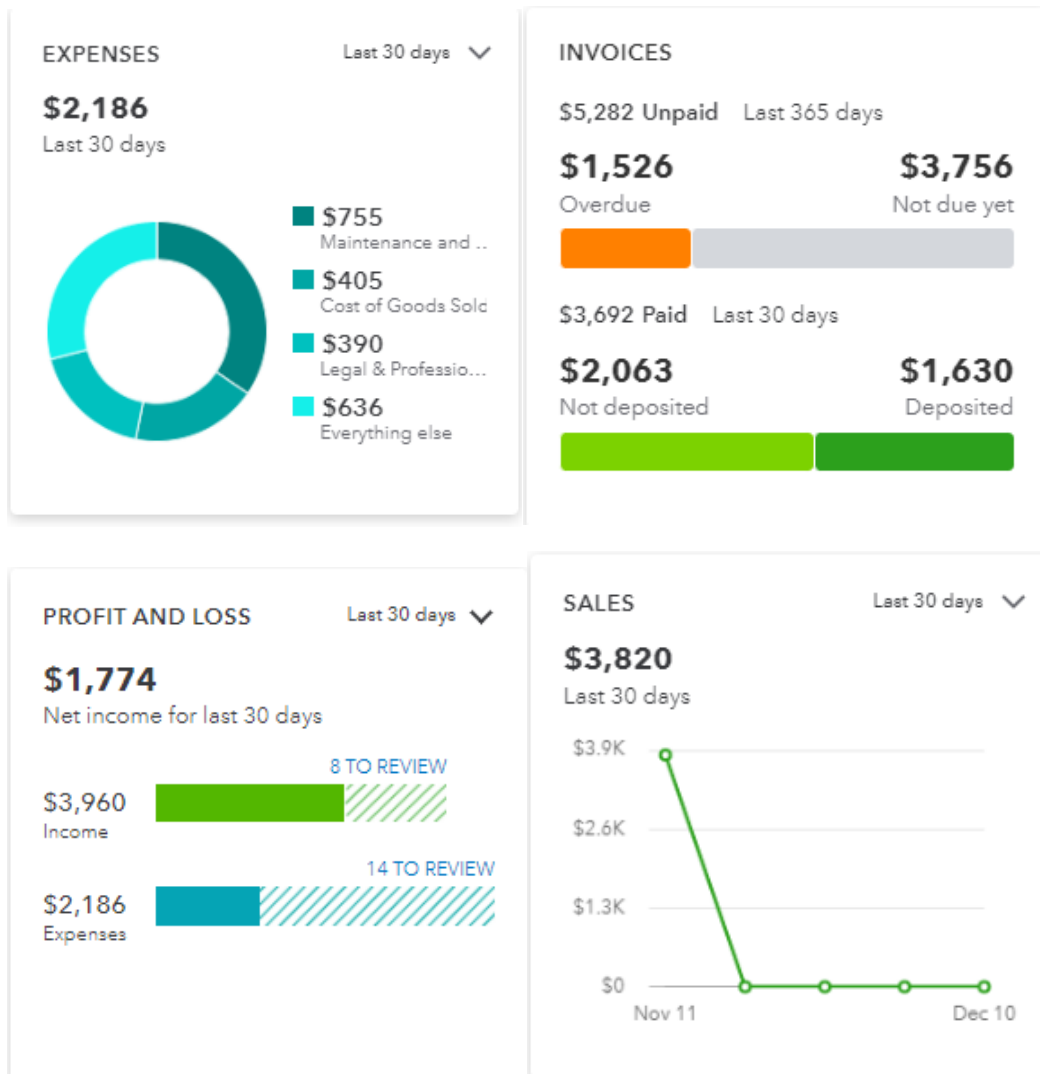
Customer Contact List

Craig's Design and Landscaping Services

CUSTOMER CONTACT LIST

CUSTOMER	PHONE NUMBERS	EMAIL	FULL NAME	BILLING ADDRESS	SHIPPING ADDRESS
Amy's Bird Sanctuary	Phone: (650) 555-3311	Birds@Intuit.com	Amy Lauterbach	4581 Finch St. Bayshore CA 94326	4581 Finch St. Bayshore CA 94326
Bill's Windsurf Shop	Phone: (415) 444-6538	Surf@Intuit.com	Bill Lucchini	12 Ocean Dr. Half Moon Bay CA 94213	
Cool Cars	Phone: (415) 555-9933	Cool_Cars@intuit.com	Grace Pariente	65 Ocean Dr. Half Moon Bay CA 94213	
Diego Rodriguez	Phone: (650) 555-4477	Diego@Rodriguez.com	Diego Rodriguez	321 Channing Palo Alto CA 94303	
Dukes Basketball Camp	Phone: (520) 420-5638	Dukes_bball@intuit.com	Peter Dukes	25 Court St. Tucson AZ 85719	25 Court St. Tucson AZ 85719
Dylan Sollfrank			Dylan Sollfrank		
Freeman Sporting Goods	Phone: (650) 555-0987 Fax: (520) 555-7894 Mobile: (973) 555-8849	Sporting_goods@intuit.com	Kirby Freeman	370 Easy St. Middlefield CA 94482	370 Easy St. Middlefield CA 94482
Freeman Sporting Goods:0969 O...	Phone: (415) 555-9933 Fax: (520) 555-7894 Mobile: (973) 555-8849	Sporting_goods@intuit.com	Sasha Tillou	370 Easy St. Middlefield CA 94482	370 Easy St. Middlefield CA 94482
Freeman Sporting Goods:55 Twin ...	Phone: (650) 555-0987 Fax: (520) 555-7894 Mobile: (973) 555-8849	Sporting_goods@intuit.com	Amelia	370 Easy St. Middlefield CA 94482	370 Easy St. Middlefield CA 94482
Geeta Kalapatapu	Phone: (650) 555-0022	Geeta@Kalapatapu.com	Geeta Kalapatapu	1987 Main St. Middlefield CA 94303	1987 Main St. Middlefield CA 94303
Gevelber Photography	Phone: (415) 222-4345	Photography@intuit.com	Lisa Gevelber	1045 Main St. Half Moon Bay CA 94213	1045 Main St. Half Moon Bay CA 94213
Jeff's Jalopies	Phone: (650) 555-8989	Jalopies@intuit.com	Jeff Chin	12 Willow Rd. Menlo Park CA 94305	12 Willow Rd. Menlo Park CA 94305
John Melton	Phone: (650) 555-5879	John@Melton.com	John Melton	85 Pine St. Menlo Park CA 94304	85 Pine St. Menlo Park CA 94304
Kate Whelan	Phone: (650) 554-8822	Kate@Whelan.com	Kate Whelan	45 First St. Menlo Park CA 94304 USA	45 First St. Menlo Park CA 94304 USA
Kookies by Kathy	Phone: (650) 555-7896	qbwebsamplecompany@yahoo....	Kathy Kuplis	789 Sugar Lane Middlefield CA 94303	
Mark Cho	Phone: (650) 554-1479	Mark@Cho.com	Mark Cho	36 Willow Rd Menlo Park CA 94304	36 Willow Rd Menlo Park CA 94304
Paulsen Medical Supplies	Phone: (650) 557-4569	Medical@intuit.com	Kathy Paulsen	900 Main St. Middlefield CA 94303	38921 S. Boise Ave Middlefield CA 94304
Pye's Cakes	Phone: (973) 555-4652 Mobile: (973) 555-2234	pyescakes@intuit.com	Karen Pye	350 Mountain View Dr. South Orange NJ 07079	350 Mountain View Dr. South Orange NJ 07079
Rago Travel Agency	Phone: (650) 555-1596	Rago_Travel@intuit.com	Jeff Rago	753 Cedar St. Bayshore CA 94326	753 Cedar St. Bayshore CA 94326
Red Rock Diner	Phone: (650) 555-4973	qbwebsamplecompany@yahoo....	Stephanie Martini	500 Red Rock Rd. Bayshore CA 94326	500 Red Rock Rd. Bayshore CA 94326
Rondonuwu Fruit and Vegi	Phone: (650) 555-2645	Tony@Rondonuwu.com	Rondonuwu Fruit and Vegi	847 California Ave. San Jose CA 95021	847 California Ave. San Jose CA 95021
Shara Barnett	Phone: (650) 555-4563	Shara@Barnett.com	Shara Barnett	77 University Palo Alto CA 94303	77 University Palo Alto CA 94303

Expenses by Vendor Summary Report

Expenses by Vendor Summary

January - December 2020

	Total
Bob's Burger Joint	28.49
Books by Bessie	130.00
Brosnahan Insurance Agency	2,241.23
Cal Telephone	130.86
Chin's Gas and Oil	534.41
Diego's Road Warrior Bodyshop	755.00
Ellis Equipment Rental	112.00
Hall Properties	900.00
Hicks Hardware	620.51
Lee Advertising	74.86
Mahoney Mugs	18.08
Norton Lumber and Building Materials	103.55
Pam Seitz	75.00
PG&E	200.53
Robertson & Associates	865.00
Squeaky Kleen Car Wash	79.96
Tania's Nursery	563.11
Tim Philip Masonry	666.00
Tony Rondonuwu	100.00
Not Specified	34.00
TOTAL	**$8,232.59**

Summary by Customer Summary Report

Sales by Customer Summary

January - December 2020

	Total
Amy's Bird Sanctuary	630.00
Bill's Windsurf Shop	260.00
Cool Cars	2,194.00
Diego Rodriguez	140.00
Dukes Basketball Camp	422.00
Dylan Sollfrank	337.50
Freeman Sporting Goods	
0969 Ocean View Road	1,058.75
55 Twin Lane	205.00
Total Freeman Sporting Goods	**1,263.75**
Geeta Kalapatapu	582.50
Jeff's Jalopies	75.00
John Melton	750.00
Kate Whelan	225.00
Kookies by Kathy	75.00
Mark Cho	291.00
Paulsen Medical Supplies	954.75
Pye's Cakes	-8.75
Red Rock Diner	226.00
Rondonuwu Fruit and Vegi	75.00
Shara Barnett	
Barnett Design	274.50
Total Shara Barnett	**274.50**
Sonnenschein Family Store	335.25
Sushi by Katsuyuki	240.00
Travis Waldron	562.55
Weiskopf Consulting	375.00
TOTAL	**$10,280.05**

Implementation Plan

The implementation process will be considered an immediate cutover process in which our client would have to stop using his current system, and start using the system we have created for our client. Based on the type of system we are recommending is similar to the one that is currently in use, and there might be a chance of losing data in the cutover process. The following steps will outline the recommended implementation. Note that the construction of the system is not based on the fact that the solution is a customizable system from a cloud service.

1) Purchase a subscription with Kintone:
   a. This is done via https://www.kintone.com/
   b. It is best to purchase the subscription online, and if there are any questions or concerns, a representative will be able to assist by chat online or over the phone.
2) Install Software, Connect Hardware, and Perform an Alpha Testing:
   a. Contact a Kintone expert in order to conduct the following:
      I. Kintone experts can be contacted https://get.kintone.help/en/ or https://www.kintone.com/resources/ and start chatting online.
   b. Once the system is created with kintone. The system may be installed onto any office computer running Windows or MacOS, and make sure to check that system meets all requirements before installing.
   c. Connect hardware to client's POS system
   d. After everything is installed and connected, enter sample data and conduct an alpha test in order to make sure that the system is functioning properly.
3) Transferring and Loading Data:
   a. Contact a Kintone Expert in order to conduct the following:
   b. Upload all current data from All Data Management into our New System that is created with Kintone.
   c. Enter all inventory items into POS system by stock number
   d. Enter all vendor information
4) Beta Testing:
   a. Test the New system with real data uploaded
   b. Schedule a training session with the owner and employees to train on the new system.
5) Start using New system, and Stop using the Old system.
   a. Bring POS and New System online
   b. Make sure that everything is working properly
   c. Drop the old system

Lessons Learned

- When working with a client for a System Design project, it is extremely important to remain in close and constant contact with them. The value of their knowledge of the current system and being able to understand exactly what it is they want out of the new system cannot be overstated.

- Working in a group for a several month long project for a client is great career experience. There are always differences of opinions to work through, but ultimately the nature of a group is important to the success of this project. We all have roles to fill and jobs to do that wouldn't be possible within the time frame allotted if not for being in a group.

- Learning multiple tools for data design and graphing is invaluable in relaying the necessary information to both our client, and maybe our boss or any stakeholders. Having these tools at our disposal in the future will help us in our future information systems endeavors.