New Century Wellness Group

SYSTEM DESIGN SPECIFICATION

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CONTENTS

Executive Summary

At the request of Dr. Jones, an investigation was done to find the requirements and feasibility of creating a system to modernize the current medical and business support systems of New Century Wellness Group. After completing this investigation, it was found that current operations could be greatly improved using a modern Health Information Management System. Patient care will improve through better record keeping, appointment reminders, monitoring for potential drug interactions and other risk factors. Business operations will be streamlined by interconnecting all departments within the office. Patient retention will increase through an automated appointment reminder system. Prescriptions, orders and Insurance billing will be able to be done electronically, increasing the speed of delivery and payments. There will be a marked increase in efficiency and communication through all levels of the organization. Thereby reducing costs and increasing patient safety. Health Information Management lets you focus on the business of caring for and treating your patients, not shuffling paperwork. The initial and long-term costs will be overshadowed by the obvious benefits. As your company expands into multi-unit business, this system will ensure consistent operations across the entire organization.

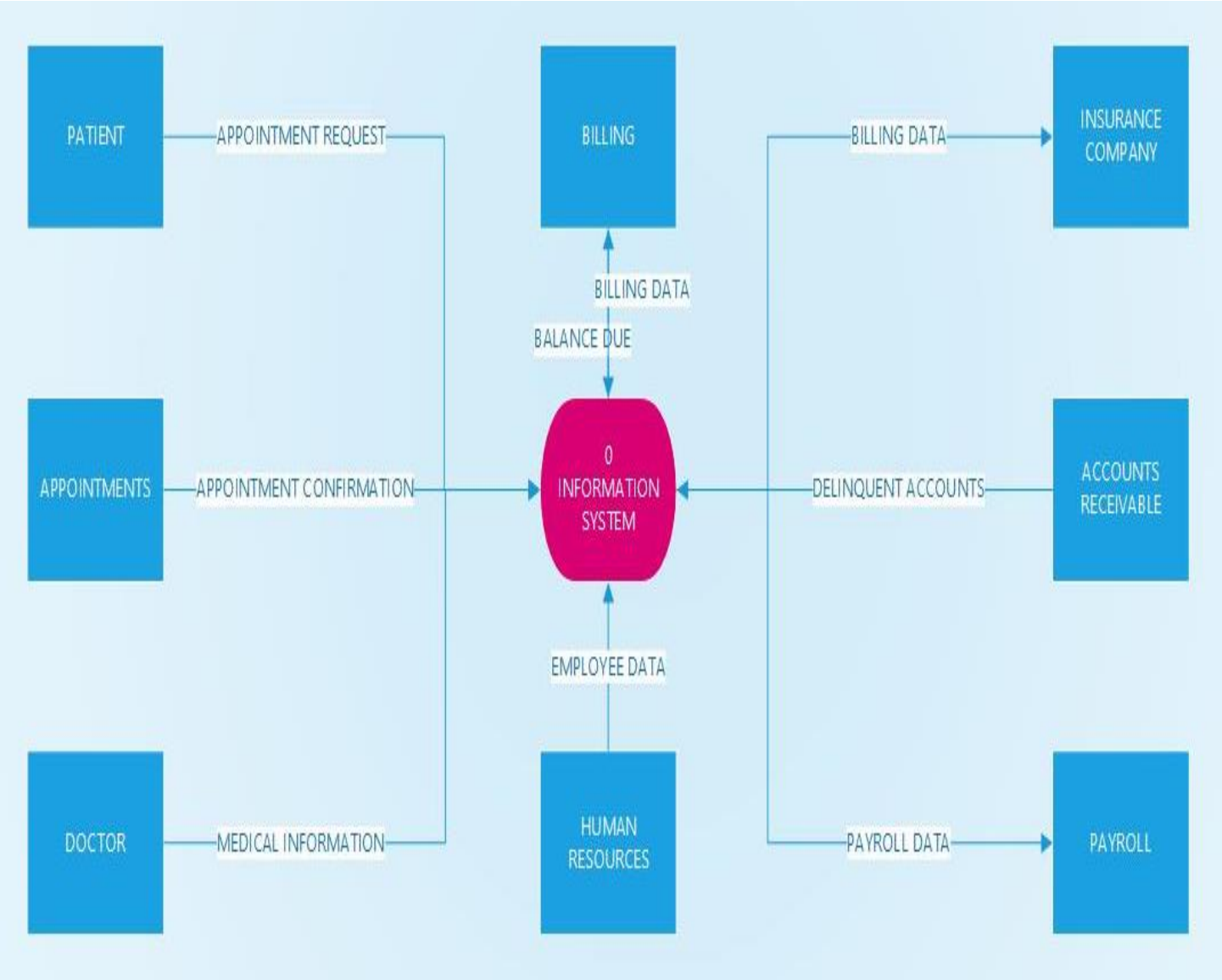
The following document presents the modeling of the information system. The requirements for output, input, processes, performance, and controls are outlined along with modeling of the data, processes, and objects. The system focuses on four main business functions; appointment scheduling, billing and accounts receivable, human resources, and payroll. A joint application development (JAD) team has been proposed along with strategies to build a feeling of ownership among the users of the system. This will greatly increase the chances of developing a useful and productive system that meets the business requirements. Also, a questionnaire has been created for distribution to all current patients, regarding their experiences with appointment scheduling and insurance billing. Multiple diagrams have been created to give insight into the modeling of various system components.

User interfaces have also been designed and included in this document for your review. These examples show the menus your employees will use for data entry and management. These interfaces have built in controls to reduce or eliminate entry errors. This feature alone is estimated to save $3900 per year in labor costs. Additionally, the need for overtime and added staff will be eliminated saving another $38,220 annually.

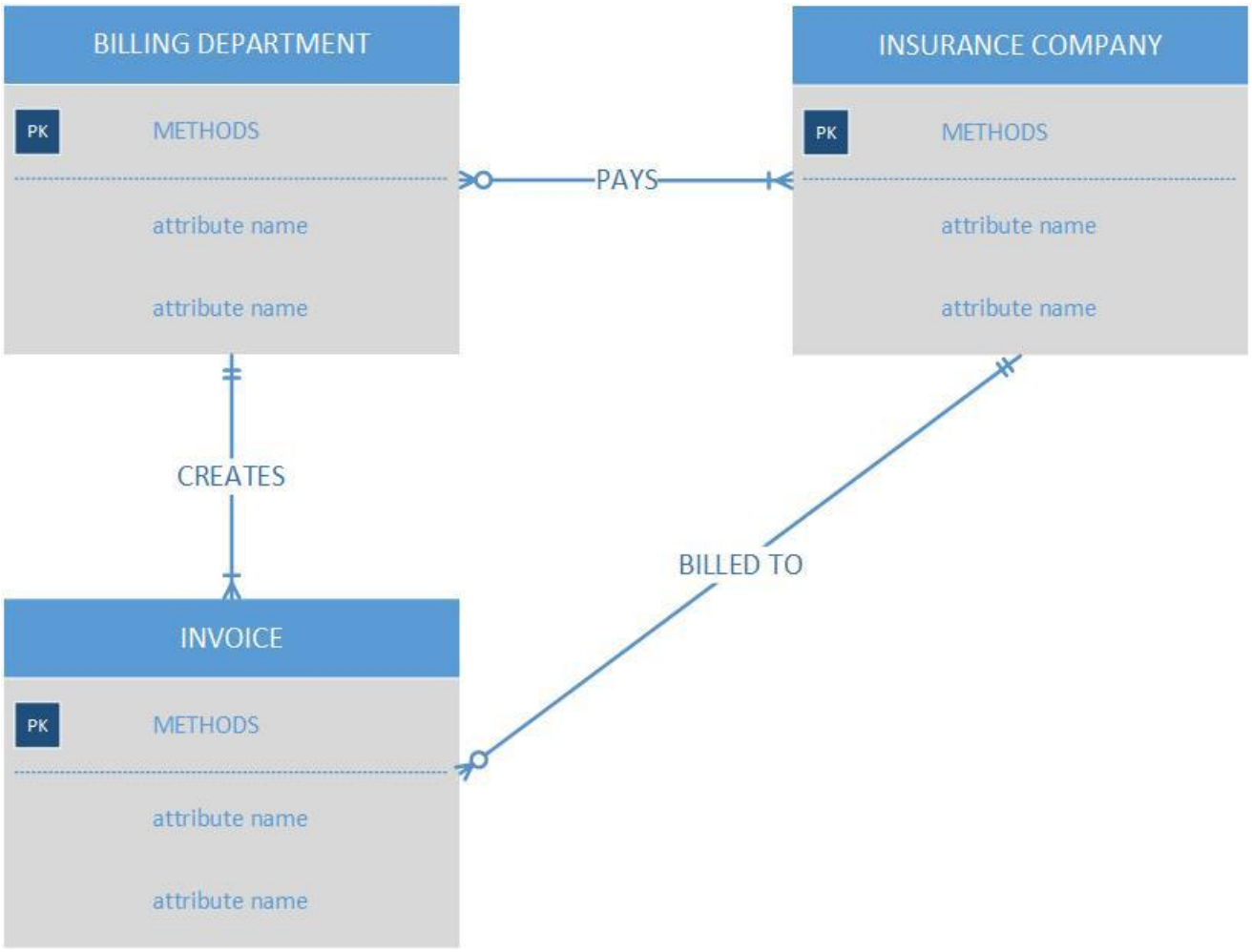
Two options for the information system are outlined in this report, in-house development and vertical software. Details of the costs and benefits are shown in the following tables. Both the options are financially beneficial to your organization. In house development will allow for your exact requirements to be met, while the vertical software, although very functional, will required modifications that may prove difficult or impossible.

Finally, a brief outline of training has been included to provide your staff with the knowledge to take full advantage of the features this system can provide.

Context Diagram



Class Diagram



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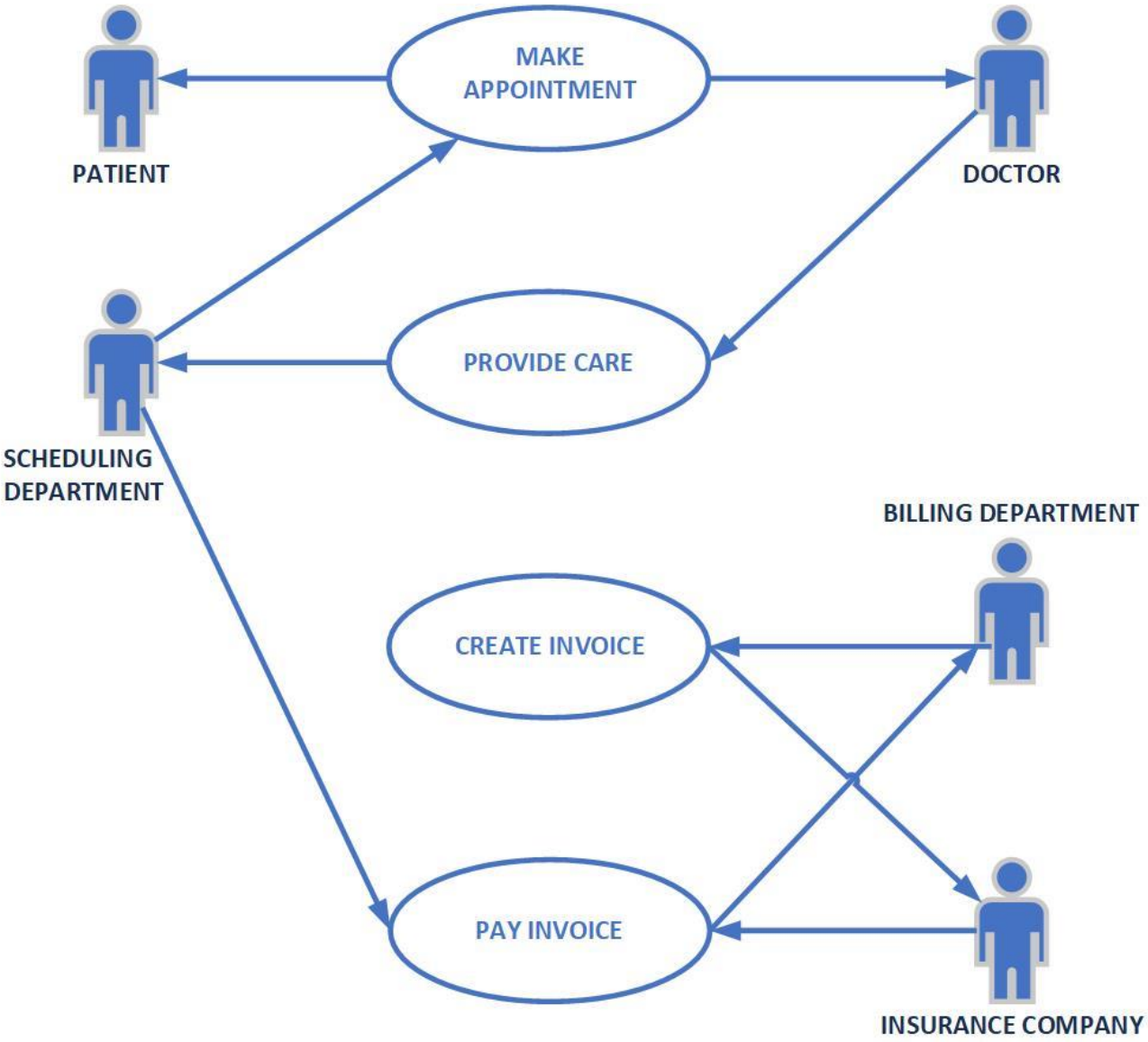
Use Case Diagram



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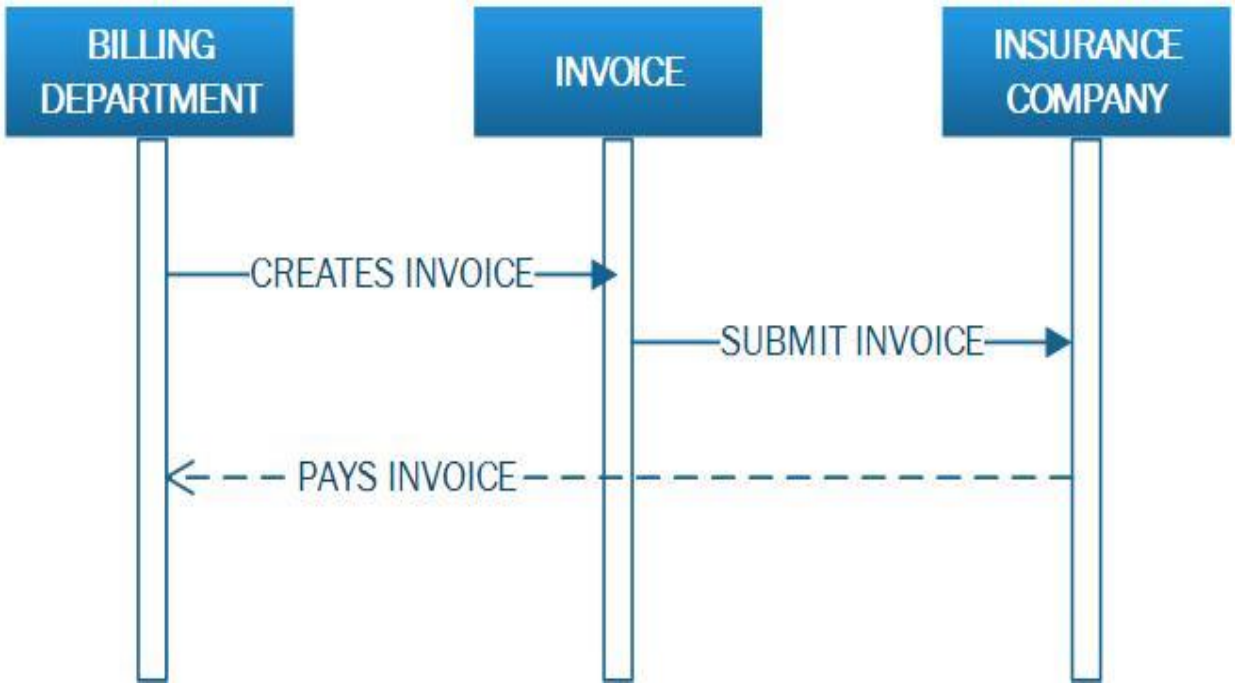
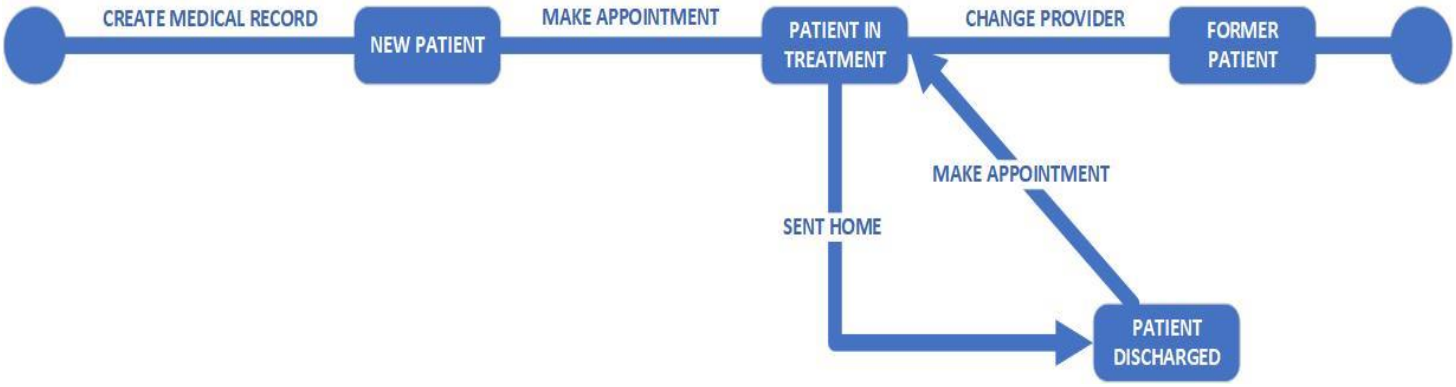
Sequence Diagram



State Transition Diagram



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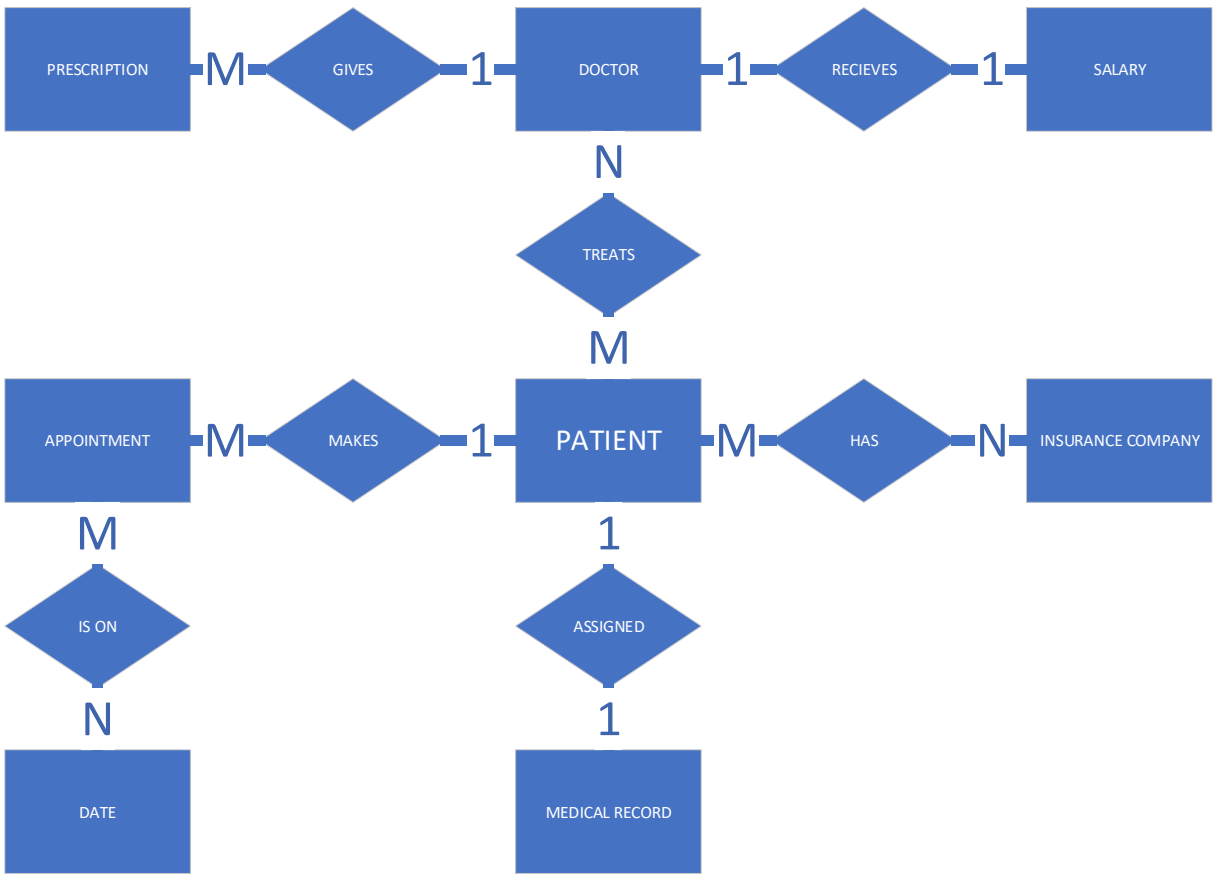
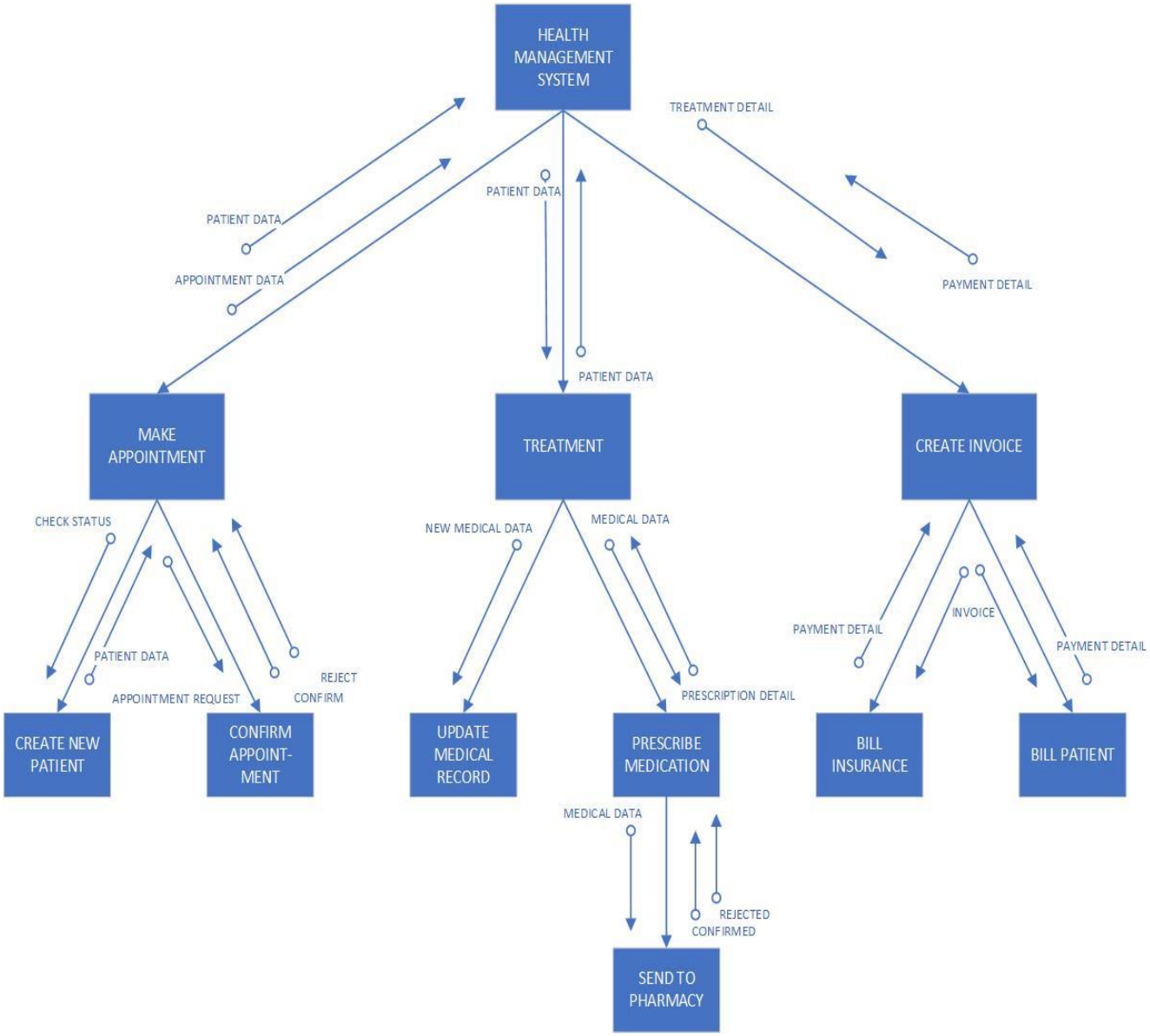
ERD Diagram


PRESCRIPTION
M
GIVES
1
DOCTOR
1
RECIEVES
1
SALARY
N
TREATS
M
APPOINTMENT
M
MAKES
1
PATIENT
M
HAS
N
INSURANCE COMPANY
M
IS ON
N
DATE
1
ASSIGNED
1
MEDICAL RECORD

Structure Chart



Data Tables

Insurance Company	
ID Number	Insurer Name
IN4789	Aetna
IN2374	Blue Cross
IN1976	United
IN0241	Cigna
IN9610	Aflac

Prescriptions		
Script Code	Prescribing Doctor	Patient
S89137	Dr. Jones	Smith, John
S42587	Dr. Jones	Brown, Jerry
S46982	Dr. Jones	Cameron, James
S18743	Dr. Jones	Hamilton, Linda
S52479	Dr. Jones	Lamb, Mary

Appointment Date			
Date	Name	Time	Doctor
05/01/18	Smith, John	11:00 am	Dr. Jones
05/01/18	Brown, Jerry	12:00 pm	Dr. Jones
05/01/18	Cameron, James	10:00 am	Dr. Jones
05/01/18	Hamilton, Linda	12:00 pm	Dr. Jones
05/01/18	Lamb, Mary	01:00 pm	Dr. Jones

Patient				
ID Number	Name	DOB	SSN	Insurance ID
P00012	Smith, John	02/14/67	168-28-9634	IN4789
P01287	Brown, Jerry	12/25/83	223-87-6248	IN2374
P00961	Cameron, James	03/17/92	179-71-3357	IN4789
P02278	Hamilton, Linda	10/31/54	302-52-7214	IN0241
P03487	Lamb, Mary	05/05/78	197-23-5819	IN2374

Data Stores

Patients

Name

Address

Date of birth

Insurance provider

Phone number Medical Info

Employees

Name

Salary

Position

Date of Hire

Address

Phone Number

Account Receivable

Account older

Balance

Due date

Appointments

Date

Time

Patient

Doctor

Reason

Data Flows

Patient Name

Time

Date

Treatment

Doctor Name

Insurance Company

Amount Due

Date Due

Payment

Balance

Salary

Pay Rate

Hours Worked

Net Pay

LABEL	Patient Name
ENTRY TYPE	Data Element
DESCRIPTION	Any string of alphabetic characters
ALIAS	Name, Patient

LABEL	Social Security Number
ENTRY TYPE	Data Element
DESCRIPTION	Any 9-digit number
ALIAS	SSN

LABEL	Patient ID number
ENTRY TYPE	Data Element
DESCRIPTION	Any 5-digit number preceded by the character ‘P’
ALIAS	Patient number, ID

LABEL	Insurance ID number
ENTRY TYPE	Data Element
DESCRIPTION	Any 4-digit number preceded by the characters ‘IN’
ALIAS	Patient number, ID

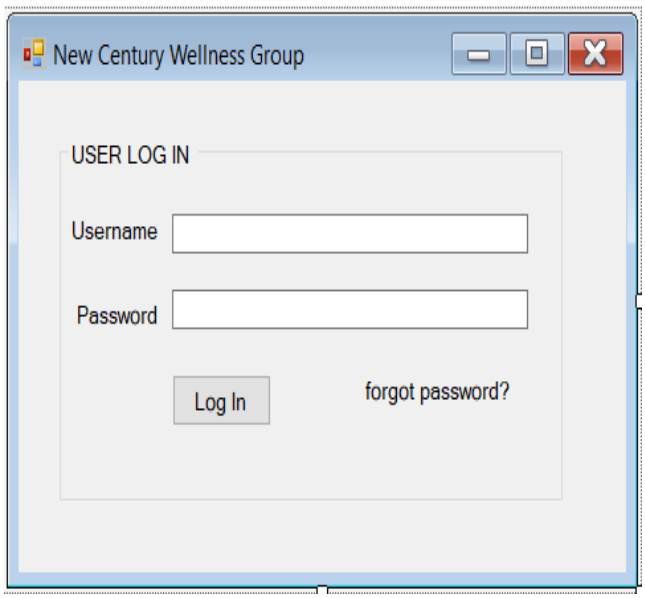
LABEL	Insurance Company
ENTRY TYPE	Data Element
DESCRIPTION	Any string of alphabetic characters
ALIAS	Insurer, Insurance

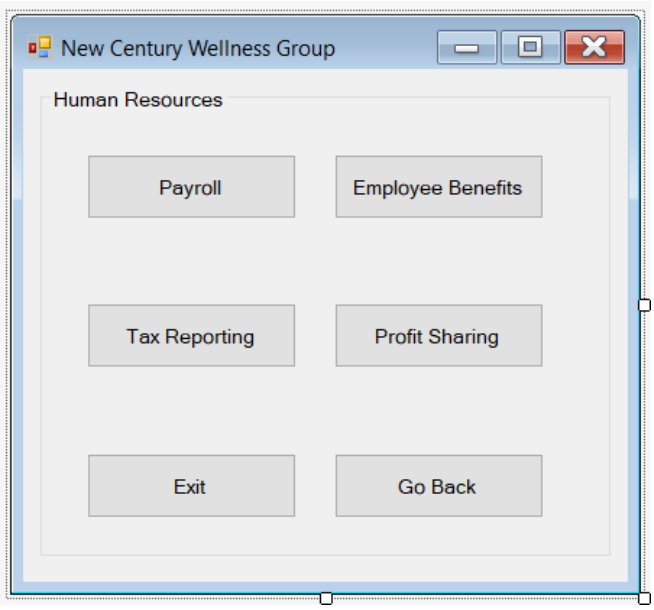
LABEL	Script Code
ENTRY TYPE	Data Element
DESCRIPTION	Any 5-digit number preceded by the character ‘S’
ALIAS	Prescription, Prescription number, Script number,

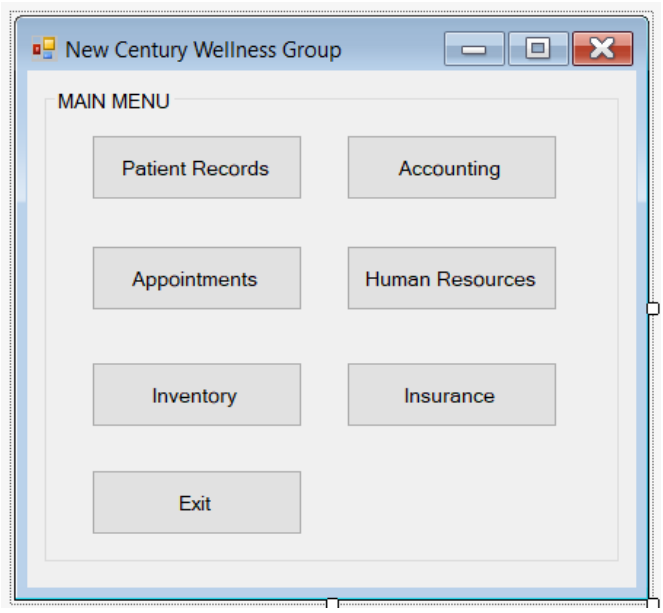
Data Dictionary and Process Description

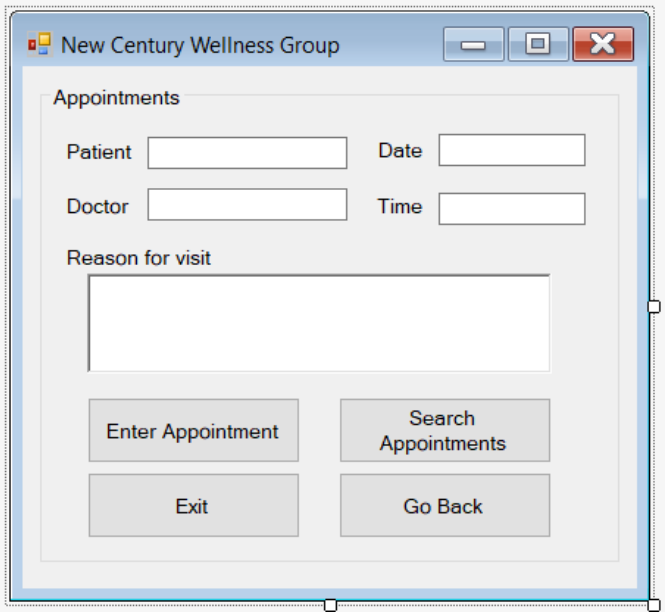
```
Name: CREATE PAYCHECK
Description: TO USE EMPLOYEE PERSONAL AND SALARY INFORMATION TO CREATE A
PAYCHECK
Process number: 1.7
Input data flows: SALARY, PAYRATE, HOURS WORKED, NAME
Output data flows: NET PAY
Process steps and logic:
 for each NAME
     if SALARY  > 0
        output NET PAY = SALARY
     else
        if HOURSWORKED <= 40
              output NETPAY = PAYRATE * HOURSWORKED
        else
              if HOURSWORKED > 40
                  output NETPAY = (40*PAYRATE) +( (HOURSWORKED-40)*(PAYRATE*1.5))
```

User Interfaces

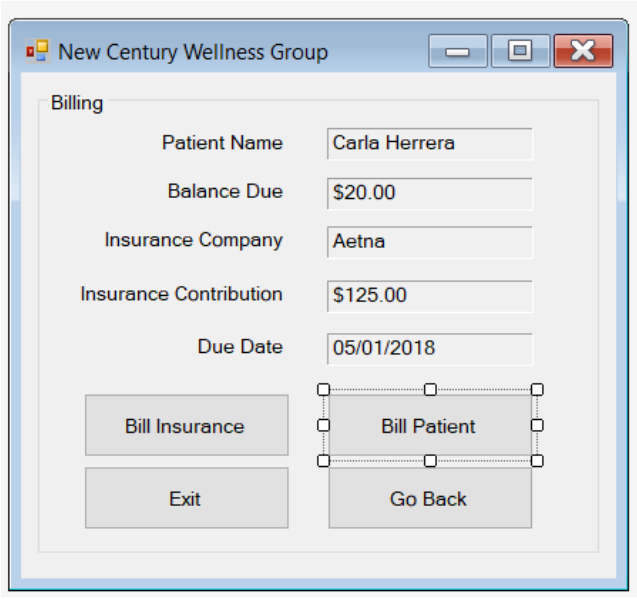


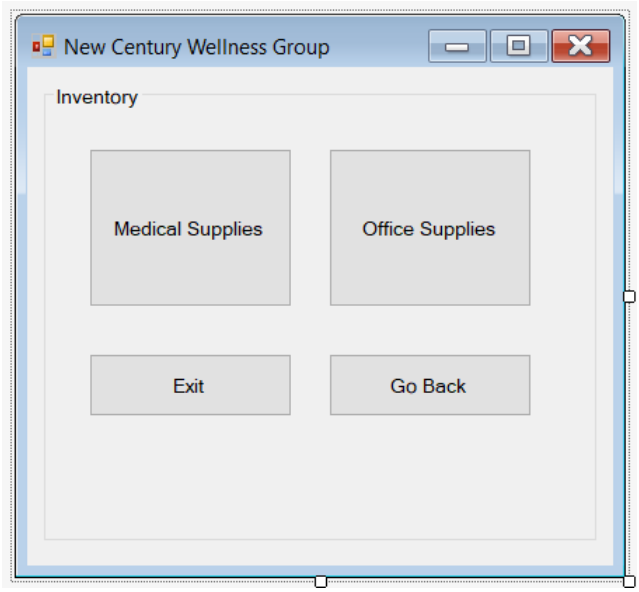


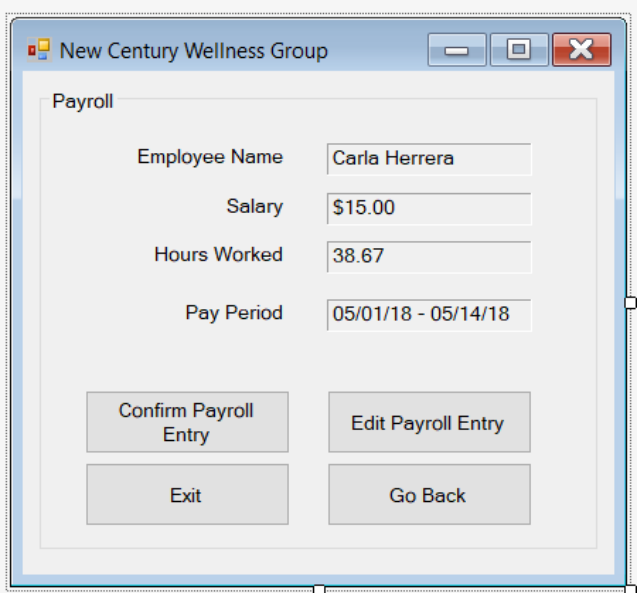




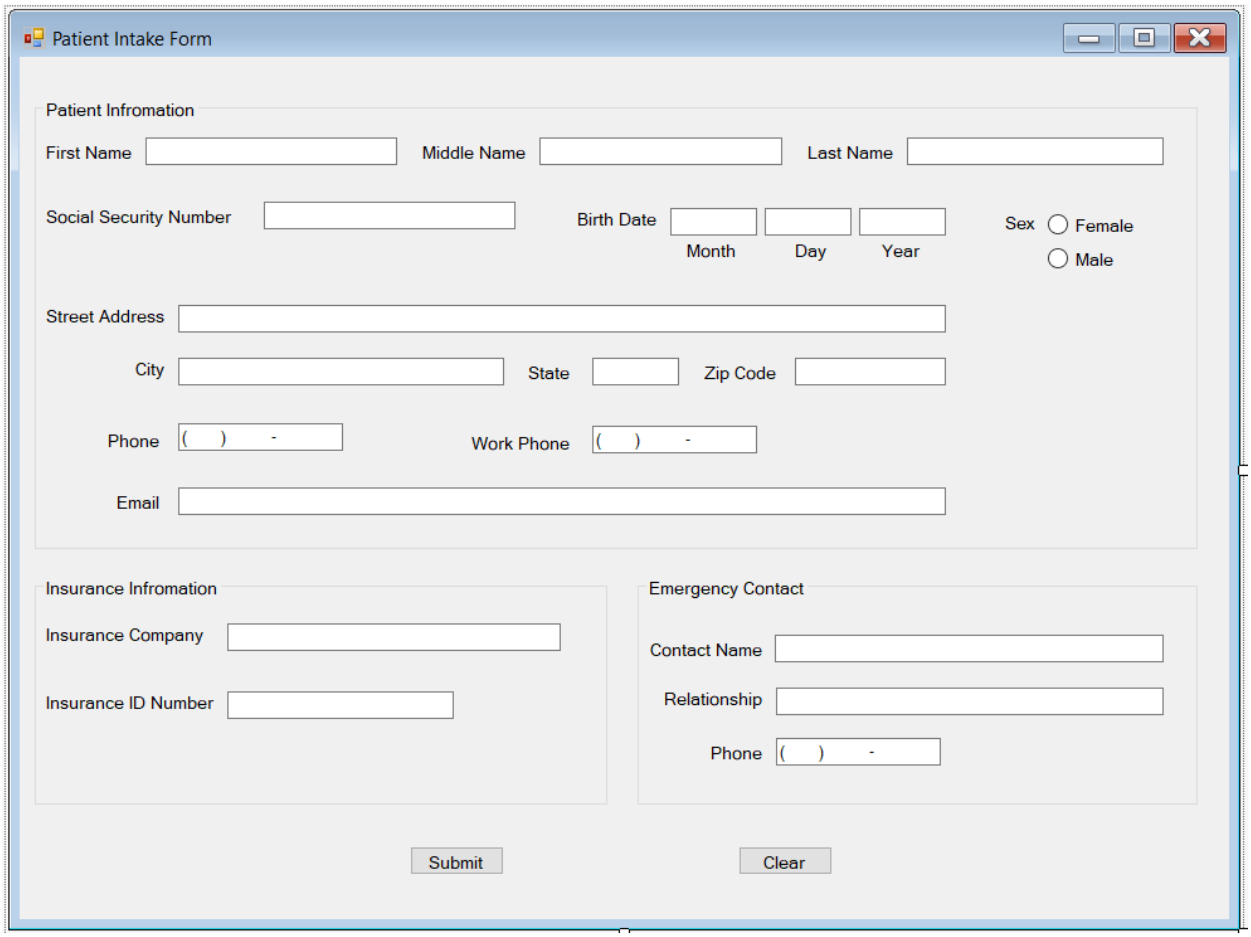
User Interfaces







Patient Data Entry Screen



Input Control Features

To reduced entry errors, the following controls will be applied to the entry form:

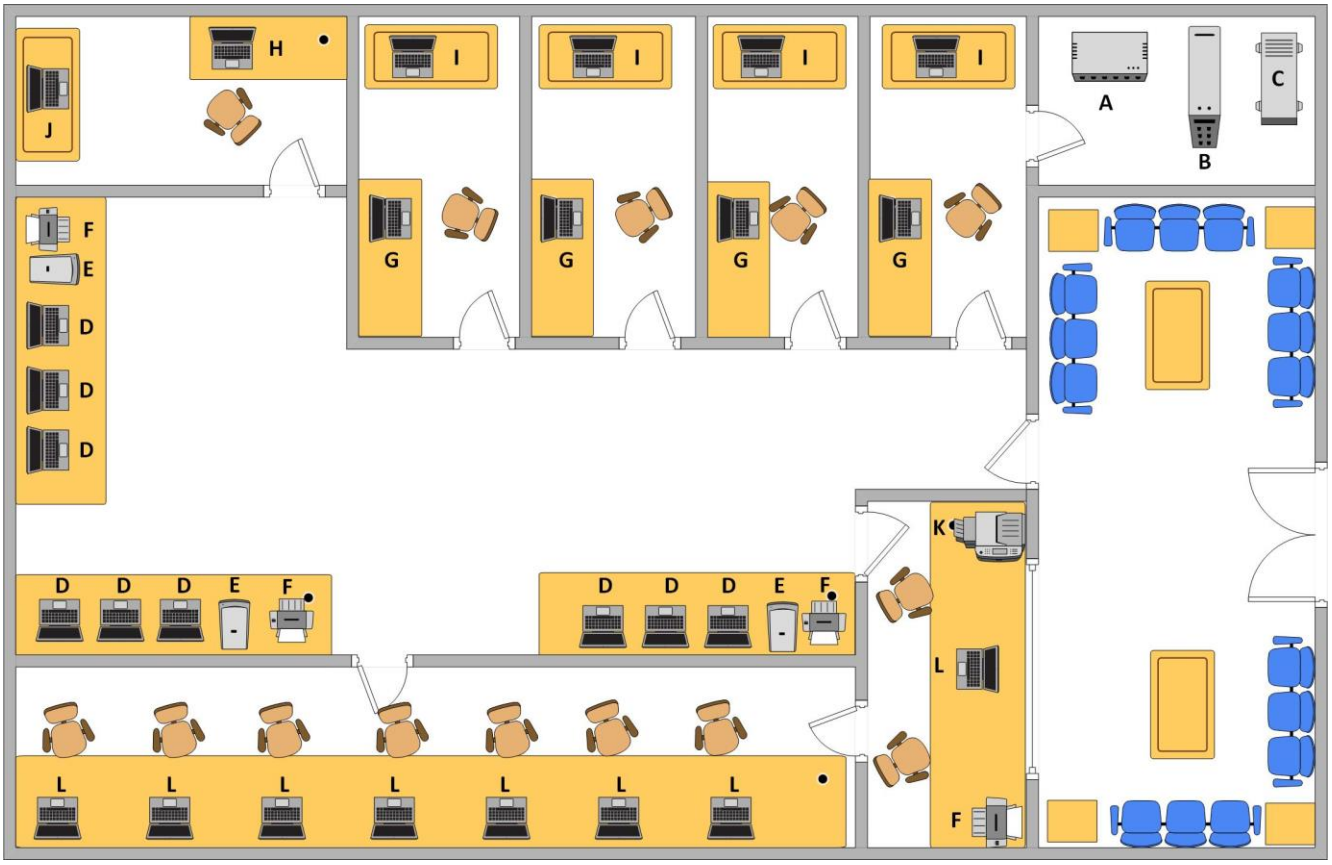
- Labels are used to identify all entry fields.
- Submit Button will not execute unless all fields are complete
- Text boxes are coded to test for numeric input in zip code, social security and phone number fields. Those fields are also formatted for length.
- Group boxes are used to group fields by category.
- Drop down menu containing all accepted insurance companies.
- Spin Button used to select the state abbreviations.
- Spin Buttons to select the month day and year of the birth date
- Toggle Buttons for sex selection.
- Email validation will be applied to the email field

Additional Output Technology

Printed output has an important role however other forms of output will also prove valuable to the business.

- Email and text notifications will be sent to patients confirming appointment date and times. Within the notification will be links to add the appointment directly to the patient's device calendar.
- Web based output will send invoices directly to insurers and prescriptions directly to pharmacies.
- Outputs to internal databases will update patient records, scheduling and inventory.

Floor Plan



A – 35 PORT SWITCH

B - ROUTER

C - SERVER

D – NURSE STATION NODE

E - SCANNER

F – LASER PRINTER

G – PCP NODE

H – NP NODE

I – THERAPIST NODE

J – NUTRITIONIST NODE

K – IMPACT PRINTER

L – SUPPORT STAFF NODE

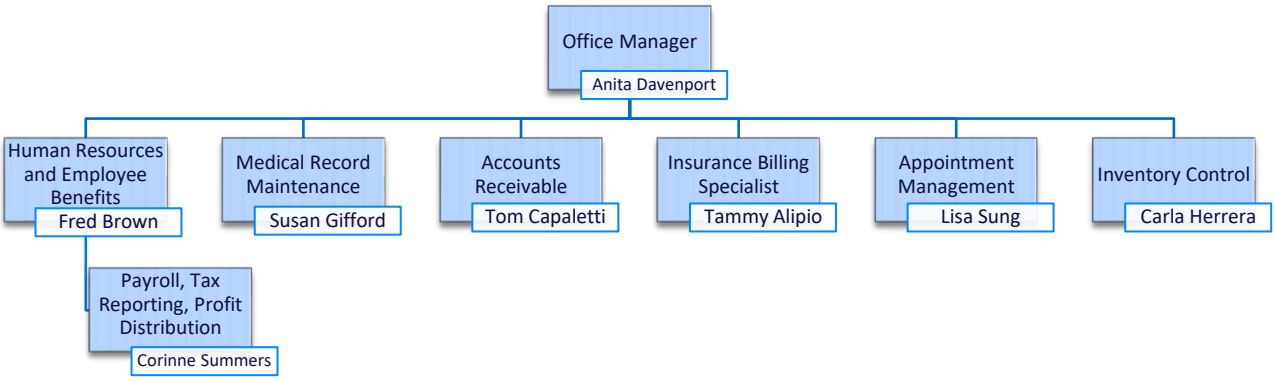
Topologies

This system will be implemented using a star network topology. Although the physical topology does not resemble a star, the connections to each network device radiate from a network switch located in the server room. The switch sends traffic only to the network device that requires the data. This topology is easily scalable and versatile. However, the entire network is based upon the functioning of the switch. A backup switch should be installed to prevent the network from going down.

Implementing a wireless topology in addition to its wired counterpart would provide the capability of adding hand held devices along with serving as a backup network. Based on the size of the office I would suggest an Extended Service Set or ESS. The ESS provides multiple access points to ensure complete network coverage throughout the office. Also, I recommend a private network for business usage and a public network for patient use.

Although a wireless network provides convenience and versatility, it also creates additional security concerns as a wireless network is more vulnerable to intrusion. Additionally, wireless networks are susceptible to interference from various sources of electromagnetic radiation.

Business Processes



Susan Gifford - Patient records. This process requires patient name, address, phone number, email, date of birth, insurance information, and medical history. This process will produce a document containing all the patient's information. This will be the resource for creating the patient objects within the software.

Corinne Summers - Payroll Processing. This process requires employee name, address, social security number, W-4 information, salary, hours worked, and job function. This process will produce the information calculate the employees gross pay, withholdings and net pay.

Tom Capaletti - Accounts receivable. This process will require a patient's information and medical costs. It will require billing information from insurance companies and patients. The process will produce a statement containing the balance due for each medical procedure.

Tammy Alipio - Insurance billing. This process requires patient information, insurance policy information, and medical costs. The process will produce a bill to submit to the insurance company for payment.

Lisa Sung – Appointment Management This process requires a patient's information, date and time of the appointment, and reason for the visit and the name of the physician. The process will create a calendar of appointments.

Carla Herrera - Inventory control. This process will require the beginning inventory, quantity used, the ending inventory, vendor information, cost of items, and a list detailing when and how the inventory was used. The process should create a document showing the usage of each item and create an order to be placed with appropriate vendors.

Preliminary Investigation

The first step is to understand the problem by investigating the causes and effects. I will use a fishbone diagram to create a graphical representation a provide a map to assist in uncovering the root causes not just symptoms.

Next, we will define the project scope and constraints. It is important that the boundaries of the project are specifically defined to prevent mission creep and create an undesirable result. We will create a list of what the system must do, should do, could do, and won't do. This step is additionally important to identify any constraints that the system must satisfy.

Factfinding must be done to understand the requirements of the project and resulting system. To do this we will use an organizational chart to identify the roles of the staff. Then, we will conduct a series of interviews with staff and patients, review current documentation, and observe current operations.

Finally, we will analyze the data to develop a plan including the costs, benefits, and schedule of the project.

A preliminary investigation has been completed to identify the requirements and feasibility of implementing a new system within New Century Wellness. The investigation found your business can greatly benefit from the implementation of a computer aided business management system. Software linking the departments of your organization would greatly increase efficiency and patient care. We recommend utilizing a Health Information Management System to streamline the flow of information from the time of the first appointment to the final billing. Automated tracking of patient's appointments will provide better patient retention and delivery of services. Computerized record keeping, and prescription ordering will cut down on errors, making patients safer and lowering the possibility of malpractice suits. This software can be used with existing hardware making this transition less costly.

Preliminary Investigation

After investigating, we have found the feasibility of this project to be very high.

Operationally, the organization is already familiar with the duties involved in the medical industry. The use of this new system will not replace current employees, but rather streamline their current tasks. The owners of the business understand the need and strongly support an upgrade to current systems.

Technically, the current staff is computer literate and with will be able to operate the new system with little training.

The economics of a new system vary based on the requirements of the organization. Also, there are multiple software solutions available commercially, such as Kareo or ChartLogic. Regardless, the cost of an upgraded system is outweighed by the benefits of efficiency and patient safety.

As previously stated, there are current software solutions available that would greatly decrease the time to implement a new HIM system. Developing software from the ground up may not be an ideal solution for a growing company poised to open a new location in coming months.

Health Information Management

Information Technology can provide major advantages to your business through the application of Health Information Management Systems. Electronic Medical Records (EMR), Computerized Provider Order Entry (CPOE), and Clinical Decision Support (CDS) are three systems that can greatly increase efficiency, reduce costs, and reduce errors.

Electronic Medical Records (EMR) are digital versions of a standard paper chart that contains all a patient's medical history from a specific practice. Implementing an EMR system may be beneficial because it can assist you in tracking data over time, identify patients due for visits, and monitor important patient information such as blood pressure reading and vaccinations. Most importantly it will improve the overall quality of care provided by your practice.

Computerized provider order entry (CPOE) deals with the process of providers entering and sending treatment instructions. By using a computer to process orders, including medication, laboratory, and radiology orders, your organization can improve patient safety and improve efficiency. CPOE can help reduce errors by ensuring providers produce standardized, legible, and complete orders. A CPOE system may include built-in clinical decision support tools that are designed to check for drug interactions and allergies. Also, by submitting electronically, pharmacies and laboratories will receive orders faster, saving time for you and your patients.

Clinical Decision Support (CDS) provides your staff with information, intelligently filtered and presented at appropriate times, to enhance the health care of your patients. A CDS system includes tools to assist your staff in making critical decisions. These tools include computerized alerts; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support, and contextually relevant reference information. CDS will increase quality of care and avoid mistakes.

Key Project Management Terms

Concurrent task - A task that can be completed at the same time as another task.

Critical path - A series of tasks with no slack time. If any task along the critical path falls behind schedule, the entire project schedule is delayed.

Dependent task - A task is said to be dependent when it must be completed in a sequence.

Duration - The amount of time it will take to complete a task.

Event - A reference point that marks a major occurrence. Used to monitor progress and manage a project.

Gantt chart - A horizontal bar chart that illustrates a schedule and progress. Developed by Henry L. Gantt as a production control technique.

Person-day - The amount of work that one person can complete in one day.

PERT/CPM - Program Evaluation Review Technique (PERT) / Critical Path Method (CPM) Shows a project as a network diagram. The tasks are displayed as nodes containing pertinent information. Developed separately, the PERT and CPM methods are identical.

Predecessor task - A single prior task upon which two or more concurrent tasks depend.

Project coordinator - The person who handles administrative responsibilities for the development team and negotiates with users who might have conflicting requirements.

Project leader - The person charged with leading a project from a technical perspective.

Project management - The process of planning, scheduling, monitoring, controlling, and reporting the development of an information system.

Project manager - The person in charge of managing a project from an administrative perspective.

For this project I recommend the development of an Enterprise Resource Planning (ERP) system. ERP is the integrated management of core business processes using software and technology. ERP is a suite of integrated applications used to collect, store, manage and interpret data from all business activities. ERP can be used to process data in real time, giving you an advantage over competitors as well as providing the best possible care to your patients.

The development team will use an Object-Oriented approach to the application development. This method treats patients, doctors, invoices, appointments, etc. as objects containing both data and program logic. Individual objects belong to classes of objects with similar attributes. The Class Diagram contained in this report shows an example of the interaction between these classes. The use of this method allows the creation of modular programming that can reused.

The team will use a variety of tools in the development process. The Entity Relationship, Class, Use Case, Sequence, and State Transition Diagrams provide the framework from which the application will be developed. Flow charts, pseudocode, and decision tables will be developed using these diagrams that have been created during earlier phases.

Flow charts represent the program logic and interactions graphically. Using flowcharts allows the system to be broken down into smaller subsystems that are easier to code. They are very useful in modular programming.

Pseudocode is a middle ground between the programming language and plain English. It doesn't require any specific rules or syntax. It creates an outline for future coding and continues to define the program logic.

Decision trees and tables serve to further develop the logic rules for the system. They show the conditions and possible outcomes of the system.

Joint Application Development

Using JAD techniques for fact finding and requirements modeling places the user at the center of the development process. The decision to include the user plays an important role in the user taking ownership in the process.

To ensure a positive result and cultivate the sense of ownership among the users I will first create a JAD team including manager, users, and IT professionals. This system will address appointment scheduling, billing and account receivable, human resources and payroll.

The following individuals will serve as users on the JAD team based on their expertise with the fore mentioned business processes.
Fred Brown – Human Resources
Corinne Summers – Payroll
Tom Capaletti – Accounts Receivable
Tammy Alipio – Billing
Lisa Sung – Appointment Scheduling.

Additionally, Dr. Jones and the office manager, Anita Davenport, will serve as managers on the team.

To minimize distraction and interruption, this team will meet over a period of days, at an off-site location. The users will be asked to review the system design and offer comments throughout the process. There will be continuous review of the system, including brainstorming and debate, as the system is refined with constant user input.

Output

- The billing system must produce itemized bills for submission to insurance companies.
- The accounts receivable system will create a weekly statemen detailing the outstanding balances of all accounts. Additionally, individual statements are required for submission to account holders.
- The appointment scheduling system must create a weekly and daily schedule of all appointments including the patient's and doctor's name, the reason for and the time of the appointment.
- The human resources system must produce an employee record for each employee of the center. This record includes name, address, emergency contact, and benefits information.
- The payroll system will produce a payroll document detailing all salary and withholdings information for each department and employee. A paycheck will be produced for each employee

Input

- The billing system requires patient information, details of the medical procedure and medications prescribed, and insurance company information.
- The accounts receivable system requires the account holder's information, the date of the procedure, and the balance due on the account.
- The appointment scheduling system requires the patient name and phone number, the date and time of the appointment, the doctor's name, and the reason for the appointment.
- The human resources system requires the name, address, social security number, immigration status, and date of birth of the employee.
- The payroll system requires the name, salary, hours worked, and W-4 information of the employee.

Requirements Checklist

Process

- The billing system must calculate the total amount, total due from the insurance company, and the remainder due from the patient
- The accounts receivable system must automatically identify delinquent accounts
- The appointment scheduling system must create a schedule for each doctor with no double bookings or overlapping appointments
- The human resource system must interface properly with the payroll system.
- The payroll must calculate the net and gross pay for each employee.

Performance

- The billing system must produce a bill before the patient leaves the office.
- The accounts receivable system must prepare statements every Monday.
- The appointment scheduling system must accommodate appointments up to six months in advance
- The human resource system must be able to e-verify all employees for employment eligibility
- The payroll system must capable of creating physical paychecks along with direct deposits.

Control

- All bills must be assigned a unique invoice number
- All account payments must be verified by a member of the billing department
- All appointments must be checked against the doctors' work schedule every morning
- No employee may become active until their employment eligibility is confirmed
- Payroll cannot be released without the review and consent of the payroll specialist.

Test Plan

Extensive testing is done to verify the proper functioning of the system. Individual units have been tested along with their integration with other units, and finally the system is tested in its entirety.

Unit testing begins by feeding both correct and erroneous data into the individual modules of the system. A range of data, including minimum and maximum values, along values outside the accepted range are sent to the system. All output is recorded and compared against expected results.

Once each unit of the program has been tested and confirmed to give correct output, integration testing is done to teat the relationships between each of the units. For example, when a patient receives treatment the patient's medical record is updated and an invoice is created. The output data from the treatment becomes input for the invoices and patient record.

After integration testing has been completed, system testing is done to confirm the system operates correctly. In this phase users will test the system alongside the development team to verify the system's usability. This final test of the program verifies that all components are working correctly together. The system is also tested for its ability to handle network traffic and maintain functionality under real world conditions.

Training

A well-designed system is only effective when its users know how to take advantage of the full range of its features. Because your staff has been an integral part of the design process, the training process for current employees can be completed in four one-hour sessions. These interactive sessions will be held onsite, immediately following the close of business.

Session 1
Group: All staff members
Topics: System overview – software and hardware
Purpose of the System
System functions and limitations
Startup/Shut down
Security
Troubleshooting
Emergencies/Outages
FAQ/Q&A

Session 2
Group: Managers
Topics: Cost-benefit analysis
IT support
System changes
Reports and Interfaces
Staff Training

Session 3
Group: support staff and managers
Topics: Menus – main menu and sub menus
Entry Screens
Reports
Department interaction
Request Enhancements

Session 4
Group: medical staff and managers
Topics: Appointments/treatments data
Medical records
Prescriptions
Reports/Interfaces/Data Entry

New Century Wellness Group

Patient Intake Form

Patient Information

Name: _____ _____ _____
First Middle Last
Social Security Number: _____ - ____ - _____
Address: _____
City: _____ State: _____ Zip: _____
Phone: _____-_____-_____ Work Phone: ____-_____-_____
Email: _____
Sex: M F Birth Date: _____ / _____ / _____
Month Day Year

Emergency Contact Information

Name: _____
Phone: _____-_____-_____ Relationship: _____

Insurance Information

Insurance Company: _____
ID number: _____

_____

Signature_____ Date____/____/_____

Patient Questionnaire

Below is the patient questionnaire to gather information from patients regarding insurance billing and appointment scheduling. The questionnaire would be distributed to all the center's patients. A stratified sample of 10% of all returned surveys will be taken using postal codes as the criteria for stratification. I chose this method to ensure a broad sampling from across the service area. As income levels are often highly localized by neighborhood this also provides a probable variation in insurance coverages.

INSURANCE BILLING AND APPOINTMENT SCHEDULING QUESTIONAIRE

Dr. Jones has requested we perform a survey of our patients' observations and suggestions regarding insurance billing and appointment scheduling. Your assistance with this survey is greatly appreciated. Please complete and return by May 1, 2018.

A. YOUR OBSERVATIONS

Please answer each question by checking on box

1. How long have you been a patient?

- ○ **Less than 6 months**
- ○ **6 months to 1 year**
- ○ **1 year to 2 years**
- ○ **More than 2 years**

2. Have you had difficulty making appointments that meet your scheduling needs?

- ○ **Yes**
- ○ **No**

3. Have you received bills for procedures that should have been covered by your insurance?

- ○ **Yes**
- ○ **No**

4. What insurance company do you use?

5. Do you have access to an email account?

- ○ **Yes**
- ○ **No**

B. YOUR SUGGESTIONS

1. What suggestions do you have to make appointment scheduling better for our patients? Please be specific.

2. Would you like to speak to an information technology specialist directly to express any concerns or ideas regarding the billing or appointment systems? If so, please provide the following information.

Name

Telephone

Email

Overview of Costs and Benefits

Below are the annual costs associated with keeping the current system. These will be eliminated by the information system.

ANNUAL OVERTIME			
BASE RATE	**OT MULT**	**HOURS/WK**	**ANNUAL OT**
$15.00	**1.5**	**6**	**$7,020.00**

ADDITIONAL EMPLOYEE COSTS			
BASE RATE	**HOURS/WK**	**WEEK COST**	**ANNUAL COST**
$15.00	**40**	**$600.00**	**$31,200.00**

ANNUAL COST OF ERRORS			
ERRORS/DAY	**MIN/ERROR**	**DIALY COST**	**ANNUAL COST**
3	**20**	**$15.00**	**$3,900.00**

TOTAL ANNUAL COST WITH CURRENT SYSTEM			
ERRORS	**OVERTIME**	**EMPLOYEE**	**TOTAL COST**
$3,900.00	**$7,020.00**	**$31,200.00**	**$42,120.00**

Overview of Costs and Benefits

Commercial vertical software options are available. The tables below show the payback analysis and the net present value of this option. The ROI of this option is 275.94%

VERTICAL SOFTWARE OPTION PAYBACK ANALYSIS				
YEAR	**COSTS**	**CUMMULATIVE COSTS**	**BENEFITS**	**CUMMULATIVE BENEFITS**
0	$29420	$29420	---------	---------
1	$7720	$37140	$42,120	$42,120
2	$7720	$44860	$42,120	$84,240
3	$3720	$48580	$42,120	$126,360
4	$3720	$52300	$42,120	$168,480
5	$3720	$56020	$42,120	$210,600

VERTICAL SOFTWARE - PRESENT VALUE							
	YEAR 0	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**TOTAL**
BENEFITS	---------	$42,120	$42,120	$42,120	$42,120	$42,120	
FACTOR	---------	0.900	0.810	0.730	0.660	0.590	
PV OF BENEFITS	---------	$37,908	$34,117	$30,748	$27,799	$24,851	**$155,423**
COSTS	$29,420	$7,720	$7,720	$3,720	$3,720	$3,720	
FACTOR	1.000	0.900	0.810	0.730	0.660	0.590	
PV OF COSTS	$29,420	$6,948	$6,253	$2,716	$2,455	$2,195	**$49,987**
						NPV:	**$105,436**

Overview of Costs and Benefits

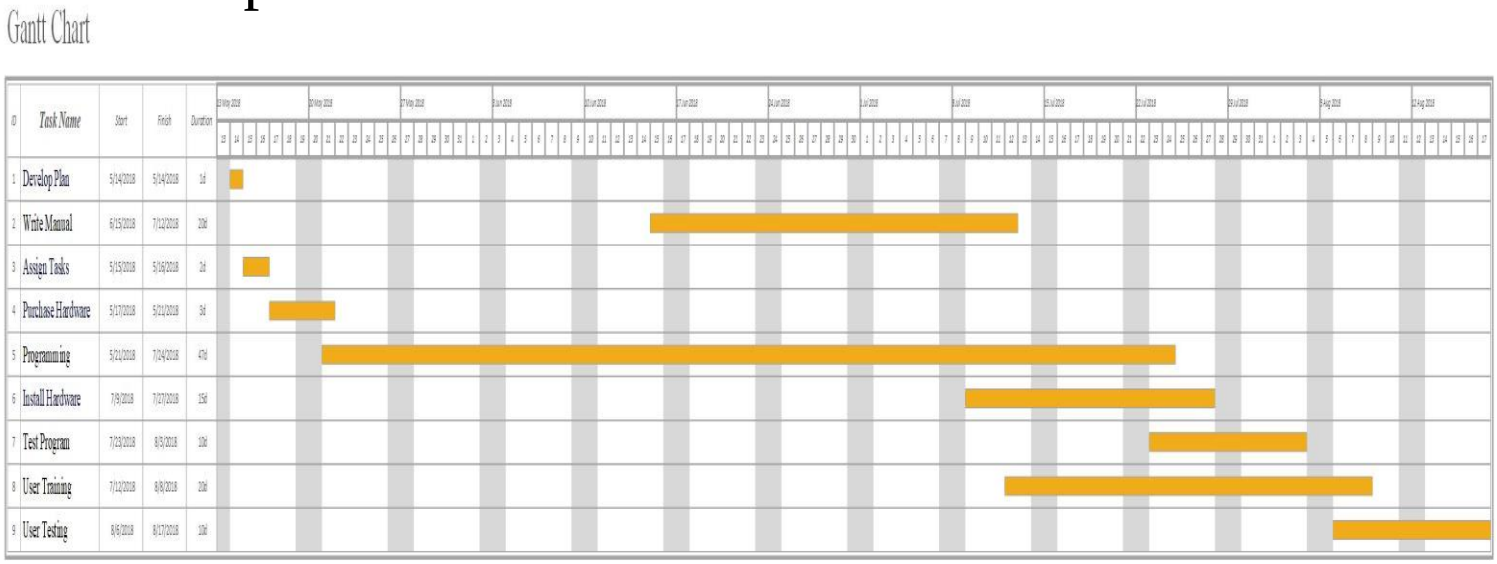
The following two tables show the payback analysis and net present value of the in-house development option. The ROI of this option is 284.87%

IN HOUSE DEVELOPMENT OPTION PAYBACK ANALYSIS				
YEAR	**COSTS**	**CUMMULATIVE COSTS**	**BENEFITS**	**CUMMULATIVE BENEFITS**
0	$39,120	$39,120	---------	---------
1	$3,120	$42,240	$42,120	$42,120
2	$3,120	$45,360	$42,120	$84,240
3	$3,120	$48,480	$42,120	$126,360
4	$3,120	$51,600	$42,120	$168,480
5	$3,120	$54,720	$42,120	$210,600

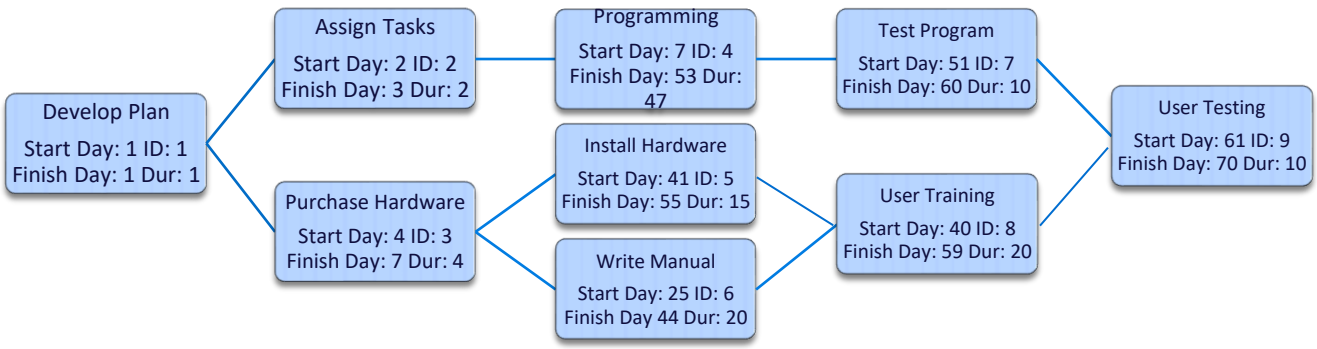
IN HOUSE DEVELOPMENT – PRESENT VALUE							
	YEAR 0	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**TOTAL**
BENEFITS	---------	$42,120	$42,120	$42,120	$42,120	$42,120	
FACTOR	---------	0.900	0.810	0.730	0.660	0.590	
PV OF BENEFITS	---------	$37,908	$34,117	$30,748	$27,799	$24,851	**$155,423**
COSTS	$39,120	$3,120	$3,120	$3,120	$3,120	$3,120	
FACTOR	1.000	0.900	0.810	0.730	0.660	0.590	
PV OF COSTS	$39,120	$2,808	$2,527	$2,278	$2,059	$1,841	**$50,633**
						NPV:	**$104,790**

Both options eliminate the need for overtime, new employees and reduce data entry errors. The in-house development option will take 12 weeks to complete. The vertical software can be installed and configured in 4 weeks. Both options will require 4 weeks of additional support along with initial hardware costs of $12,500. The vertical software option does have many of the required features but cannot be fully customized to your specifications.

Example Gantt Chart



Example PERT/CPM Chart



New Century Wellness Group

To: Anita Davenport
From: Jeremy Reimert
CC: Timothy Jones, Dolores Garcia

System Performance

I have received several notices related to system performance. During peak usage the system has been working slower than expected and has been causing operational issues. Currently, all system functions and data storage are handled by a central server located within your office. When many nodes are requesting data from the server it becomes bogged down with traffic. A combination of inadequate bandwidth along with the centralization of processing and storage is to blame for these issues. In my opinion the best solution is to decentralize system processing and database management by distributing them to other servers throughout the office. For example, appointment and billing will be located on a different server than medical data. This will reduce cross traffic and free up resources to prevent further slowdowns.

Memorandum

New Century Wellness Group

To: Anita Davenport
From: Jeremy Reimert
CC: Timothy Jones, Dolores Garcia

System Maintenance

You have requested that I perform ongoing maintenance to your information system.
System maintenance is a large and often expensive portion of a system's life cycle. Before we discuss specifics, I would like to outline the different types of system maintenance and provide some examples for you.

Corrective maintenance is performed to fix errors which could include debugging program code, replacing defective hardware, or restoring configuration settings.

Adaptive maintenance adds new capability and enhancements such as support for mobile devices, online capability, or new data entry screens.

Perfective maintenance improves efficiency by upgrading outdated hardware, using macros to handle repetitive tasks, or optimizing user settings.

Preventive maintenance reduces the possibility of future system failure through scheduled system backups, antivirus software, or defragmenting storage drives

Additionally, I have received specific requests for adaptive maintenance to provide enhancements and other non-critical upgrades. For this I would suggest the use of maintenance release methodology. This method holds all non-critical changes until a specific date when all changes will be implemented together. This reduces the impact on the users and provides a standardized pattern and documentation for the releases. For example, New Century 1.0 is our initial release, as future versions are releases they would take on the labels New Century 2.0 or New Century 2.4.

Memorandum

New Century Wellness Group

To: Anita Davenport
From: Jeremy Reimert
CC: Timothy Jones, Dolores Garcia

System Security

Security is and should always be paramount when dealing with an information system. While attacks can originate from many different sources, recently, there has been an increase in cyber attacks stemming from former employees. All users of our system have a unique user name and password. To increase the level of security I suggest an immediate change to the requirements a password must meet to be accepted by the system. For example, special characters, a mix of upper and lower-case letters, and numerals should be required. While common sequences like" 12345" and "abcde" must be excluded. Additionally, passwords must expire after a period requiring the assignment of a new password. Biometrics could also be implemented to provide an added layer of security.

Due to the sensitive nature of medical records, all data should be kept both in onsite and cloud storage. Both locations should store all data in an encrypted format. Finally, all nodes connected to the information system should run lock down software, such as WinSelect or SpyLock, to limit unintended use of the system.