Tesseract Software Designs

Arch Dental Associates

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COSC 6000 FA2 2016

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# The Problem

## Background Information

Arch Dental Associates (from now on referred to as “Arch”) is a chain of dental practices owned by a small group of partners. They have been in business for the past 25 years and are a recognized and accomplished dental establishment within the communities in which they reside. Although they do have multiple practices, they still consider themselves to be a small operation and try to take care of their employees just as though they were a family-run business.

## Problem Description

Arch has approached us with a request to help them to modernize their business processes, and to ease and simplify the use of day-to-day operations. They are looking to replace an age-old paper system of operating the business. Since they have multiple locations and multiple possible administrators, we have concluded that the best design for them would be a web-based application. This will help them to coordinate their Dental Practice and make their business more efficient from any location. It will be of upmost importance that the user interface for this application be highly user friendly and intuitive to use given that many of the users will have limited computer experience.

## Users / Roles

* User
  + These are the patients who receive services
  + Could be a primary account holder
  + Could be the primary account holder’s dependents
* Office Staff
  + An office worker or provider/dentist/hygienist
* Administrator
  + Main owner(s) of practice
  + Would typically be the owner of the practice but could also be a trusted user within the company

# Requirements

## Functional

* User (Patients)
  + Primary account holder
  + View/edit household account info
  + View/cancel appointments
  + Payments
  + Services
  + Designate primary insurance holder
  + Add/edit dependents
* Office Staff
  + An office worker or provider/dentist/hygienist
  + Create/view/update individual client account info
  + Create/view/update appointments
  + Process payments
* Administrator
  + Main owner(s) of practice
  + Would typically be the owner of the practice but could also be a trusted user within the company
  + Create/view/update any screen
  + Create/view/update office staff and providers
  + Create/view/update clinics
  + Create/view/update rooms
  + Create/view/update services
  + Create/view/update qualifications
  + Create/view/update accepted insurance

Arch would like to move to a modern/computerized system to allow their patients access to some portion of their account from home, to ensure rooms in each clinic are adequately utilized, and not double-booked, to ensure the time of each provider is adequately utilized, and not double-booked, and lastly, to provide a paperless (or at least significantly less paper) method for day-to-day business and accounting.

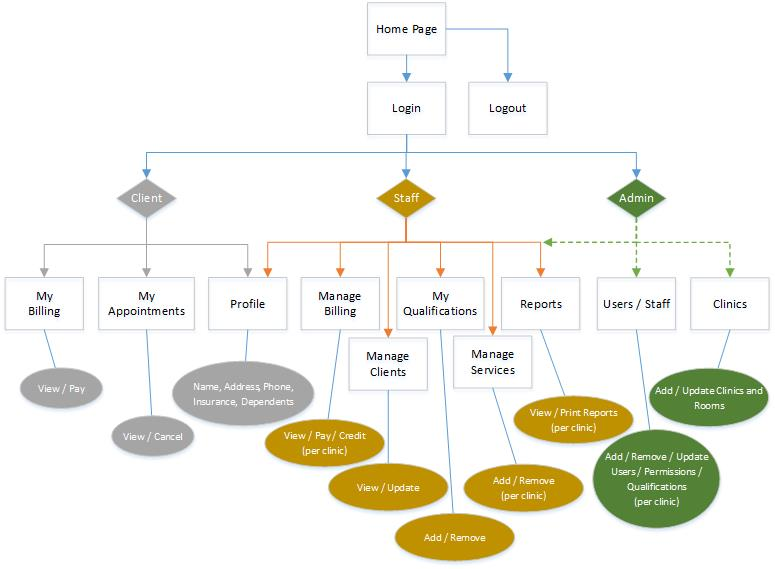
* The system shall support the following users: Client, Office, Admin
  + Client
    - The system shall designate a Primary account holder (a head of household)
    - The system shall allow the Client to view/edit household info such as:
      * Designate the household insurance company
      * Dependent information and relationship to primary
      * Birthdate of each person in household
      * Appointments coming / past and details including
        + Services rendered
        + Price
        + Provider Name
    - The system shall provide a user with a unique account number
  + Office
    - Office Staff, Doctors, Hygienists
    - The system shall allow all staff to create / update any Client account info
    - The system shall allow all staff to create / update appointments
    - The system
  + Admin
    - Main owners/partners of practice (could also be Doctors)
    - The system shall allow Admin to create/view/update any screen
    - The system shall allow Admin to create/view/update office staff and clients
    - The system shall allow Admin to create/view/update clinics
    - The system shall allow Admin to create/view/update rooms in a clinic
    - The system shall allow Admin to create/view/update services offered by a clinic
    - The system shall allow Admin to create/view/update designate which office users are providers
* The system shall provide a username / password to every user and allow user the ability to change them
* The system shall provide a unique numeric ID to each user
* The system shall obfuscate all user passwords
* The system shall track contact information for all users (name, address, phone)
* The system shall allow all staff to make appointments.
* The system shall keep track of all services (and costs for each service) a clinic provides.
  + A provider does not need to be qualified in order to perform a service the clinic offers
  + Designate a standard rate for each service
  + Designate a standard length of time to complete each service
* The system shall allow for more than one dentist and/or hygienist to provide services
* The system shall record services each provider is certified for
* The system shall allow office users and administrators to make appointments for services on a specific time/date
* The system shall allow clients to view/update their profile, and view/cancel appointments
* The system shall allow a patient to receive services from multiple providers during a visit
* The system shall track if an appointment is kept/missed/canceled
* The system shall, for each appointment, reserve a room for each service provided, note individual service lengths
* The system shall generate a single bill for an entire household
* The system shall allow Office user creating an appointment to alter standard pricing with billing reflecting both the standard and actual rates
  + The actual rate should never be higher than the standard rate
* The system shall provide the ability to generate an overall bill for all services outstanding, or provide an itemized bill for an individual appointment
  + Should contain the date of service, list of services, name of provider, and costs
* The system shall generate a bill on a monthly basis for each household
* The system shall generate a report containing all households, names, addresses, phones, person ID, dependents and relationships
* The system shall generate a report showing insurance coverage for all households including household ID, household primary account holder name, insurance company ID and name.
* The system shall generate a report containing all patients in order by person ID, name, birthdate, and also contain their insurance company and policy number
* The system shall generate a report show itemized billings for all households with household ID, primary account holder name, person ID, patient name, service, and cost ordered by primary account holder name, patient name, and billing date
* The system shall generate a report showing the total cost of all services received for each household
* The system shall generate a report showing each provider and services qualified to render
* The system shall generate a report all future appointments sorted by patient name, appointment date/time, length of service, phone – grouped by each patient
* The system shall generate a report list all services performed by each provider in order by provider name and include the service ID, service description, and cost
* The system shall generate a report, that for a given date, lists the total amount of services each provider rendered – ordered by provider name

## Non-Functional

* The system shall work only via web browser
* The system shall be optimized for the Google Chrome web browser
* The system shall have a Web API back end written in C# to support .NET 4.0
* The system shall have an HTML5 front end written in Angular JS
* The system shall have a modern/organized/consistent usability
* The system shall take into account multiple users working at the same time in order to best optimize for performance
* The system shall leverage an Oracle database for data storage
* The system shall support Microsoft IIS

# User Information

## Site Diagram



## Features and Benefits

|  |  |
| --- | --- |
| ***Feature*** | ***Benefit*** |
| Appointments accessible from any computer | * Makes doing business less confusing, more organized, constantly up-to-date, and no paper calendar to keep track of * Clients can view/cancel appointments online |
| Payments tracked by computer | * Time better optimized. Location of records and balancing books happens in a flash |
| Real-world, up-to-date data | * Room bookings always accurate * Provider bookings always accurate and fully optimized |
| Clients can manage their data online | * Lighter workload on employees when clients use online services   + Lower call instances for payments and billing questions   + Lower call instances for appointment time/date/service/cancellation questions |
|  |  |

## UI Screen Prints

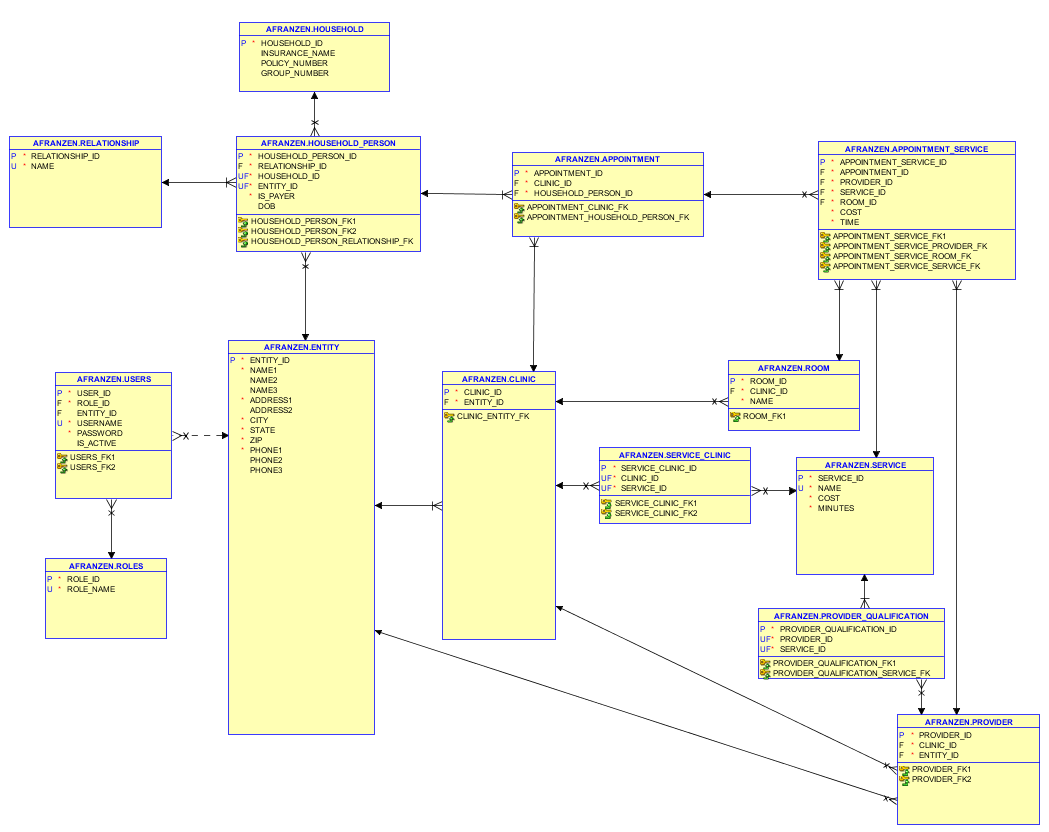
TODO

## Screen Prints / Reports

TODO

# Project Design

## ER Diagram



## Database Schema



## Data Dictionary

### Appointment Table

Table Description

This table contains data about the appointments at a Clinic.

Other Tables Referenced

Clinic, Household Person

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| APPOINTMENT\_ID | Appointment  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| CLINIC\_ID | Clinic Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Clinic  Delete – Cascades |
| HOUSEHOLD\_PERSON\_ID | Person being served Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Household Person  Delete – Cascades |

### Appointment Service Table

Table Description

This table contains data about the services of an appointment. When they start, how long they will take, who they are performed by, how much they cost.

Other Tables Referenced

Appointment, Room, Service, Provider

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| APPOINTMENT\_SERVICE\_ID | Appointment  Service Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| APPOINTMENT\_ID | Appointment  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| PROVIDER\_ID | Provider Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Clinic  Delete – Cascades |
| SERVICE\_ID | Service Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Household Person  Delete – Cascades |
| ROOM\_ID | Room Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Room  Delete – Cascades |
| COST | Price of Service | NUMBER | 6, 2 | 9(6,2) | 0.00 – 9999.00 | YES |  |  |
| TIME | Start Time | DATE |  | >= 08:00  <= 06:00 | 1-9999 | YES |  |  |

### Clinic Table

Table Description

This table contains data to identify a unique Clinic.

Other Tables Referenced

Entity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| CLINIC\_ID | Clinic Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| ENTITY\_ID | Entity Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Entity  Delete – Cascades |

### Entity Table

Table Description

This table contains name and contact information about a person in a household, a user in the system, an employee/provider of a clinic, or a clinic.

Other Tables Referenced

None

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| ENTITY\_ID | Entity  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| NAME1 | Name | NUMBER | 50 | X(50) |  | YES |  |  |
| NAME2 | Name | VARCHAR2 | 50 | X(50) |  |  |  |  |
| NAME3 | Name | VARCHAR2 | 50 | X(50) |  |  |  |  |
| ADDRESS1 | Address | VARCHAR2 | 50 | X(50) |  | YES |  |  |
| ADDRESS2 | Address | VARCHAR2 | 50 | X(50) |  |  |  |  |
| CITY | City | VARCHAR2 | 50 | X(50) |  | YES |  |  |
| STATE | State | VARCHAR2 | 2 | X(2) |  | YES |  |  |
| ZIP | Zip | VARCHAR2 | 10 | X(10) |  | YES |  |  |
| PHONE1 | Phone | VARCHAR2 | 15 | X(15) |  | YES |  |  |
| PHONE2 | Phone | VARCHAR2 | 15 | X(15) |  |  |  |  |
| PHONE3 | Phone | VARCHAR2 | 15 | X(15) |  |  |  |  |

Other Notes

Zip and Phone are intentionally any type of character to allow for hyphens, extensions, or other possible needed special characters.

### Household Table

Table Description

This table contains a unique key for each household the system and information about that home’s Insurance.

Other Tables Referenced

Insurance

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| HOUSEHOLD\_ID | Household Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| INSURANCE\_NAME | Insurance Company Name | VARCHAR2 | 50 | X(50) |  | YES |  |  |
| POLICY\_NUMBER | Insurance Policy Number | VARCHAR2 | 50 | X(50) |  | YES |  |  |
| GROUP\_NUMBER | Insurance Group Number | VARCHAR2 | 50 | X(50) |  | YES |  |  |

### Household Person Table

Table Description

This table contains data that describes a person who resides in (or is associated with) a household.

Other Tables Referenced

Relationship, Insurance, Entity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| HOUSEHOLD\_PERSON\_ID | Household Person  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| RELATIONSHIP\_ID | Relationship Name | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Relationship  Delete – Cascades |
| HOUSEHOLD\_ID | Household Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Household  Delete – Cascades |
| ENTITY\_ID | Entity Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Entity  Delete – Cascades |
| IS\_PAYER | Flag for whether primary account holder | CHAR | 1 | A(1) | ‘Y’ or ‘N’ | YES |  |  |
| DOB | Date of Birth | DATE |  | >= 00:01  <= 23:59 | 1-9999 | YES |  |  |

### Provider Table

Table Description

This table contains data about employees of a who are also providers.

Other Tables Referenced

Clinic, Entity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| PROVIDER\_ID | Provider  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| CLINIC\_ID | Clinic Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Clinic  Delete – Cascades |
| ENTITY\_ID | Entity Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Entity  Delete – Cascades |

### Provider Qualification Table

Table Description

This table contains data about the services each provider is qualified to perform.

Other Tables Referenced

Provider, Service

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| PROVIDER\_QUALIFICATION\_ID | Provider Qualification  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| PROVIDER\_ID | Provider Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Provider  Delete – Cascades |
| SERVICE\_ID | Service Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Service  Delete – Cascades |

### Relationship Table

Table Description

This table contains a list of possible relationships a person can have to the primary (payer) account holder.

Other Tables Referenced

None

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| RELATIONSHIP\_ID | Relationship Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| NAME | Relationship Title | VARCHAR2 | 50 | X(50) |  | YES |  |  |

### Roles Table

Table Description

Contains system roles a user could have

Other Tables Referenced

None

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| ROLE\_ID | Role Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| ROLE\_NAME | Name of Role | VARCHAR2 | 50 | X(50) |  | YES |  |  |

### Room Table

Table Description

This table contains data about rooms in a Clinic.

Other Tables Referenced

Clinic

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| ROOM\_ID | Room  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| CLINIC\_ID | Clinic  Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Clinic  Delete – Cascades |
| NAME | Clinic Name | VARCHAR2 | 50 | X(50) |  | YES |  |  |

### Service Table

Table Description

This table contains data services available in a Clinic.

Other Tables Referenced

Clinic

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| SERVICE\_ID | Service  Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| NAME | Service Name | VARCHAR2 | 50 | X(50) |  | YES |  |  |
| COST | Service Cost | NUMBER | 6, 2 | 9(6,2) | 0.00 – 9999.00 | YES |  |  |
| MINUTES | Time to Complete | NUMBER | 35 | 9999 | 1-9999 | YES |  |  |

### 

### Service Clinic Table

Table Description

This table contains data services available in a Clinic.

Other Tables Referenced

Clinic, Service

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| SERVICE\_CLINIC\_ID | Primary Key | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| SERVICE\_ID | Service  Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Service  Delete – Cascades |
| CLINIC\_ID | Clinic Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Clinic  Delete – Cascades |

### Users Table

Table Description

Contains user information, the role they possess, a link to their identifying/contact info, username, and password.

Other Tables Referenced

Role, Entity

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ATTRIBUTE NAME | CONTENTS | TYPE | LENGTH | FORMAT | RANGE | REQ’D | KEY | REFERENCED TABLE |
| USER\_ID | User Number | NUMBER | 35 | 9999 | 1-9999 | YES | PK |  |
| ROLE\_ID | Role Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Role  Delete – Cascades |
| ENTITY\_ID | Entity Number | NUMBER | 35 | 9999 | 1-9999 | YES | FK | Entity  Delete – Cascades |
| USERNAME | Username | VARCHAR2 | 50 | X(50) |  | YES |  |  |
| PASSWORD | Password | VARCHAR2 | 500 | X(500) |  | YES |  |  |

## Use Cases (Essential Form)

|  |  |
| --- | --- |
| **Use Case Name:** | Cancel Appointment |
| **Actors:** | Client |
| **Scenario:** | The user logs in and comes to the landing page and selects Appointments. Is presented with a list of appointments (likely only 1 or 2). Clicks the appointment of interest and is presented with all of the appointment details. The user then selects “Cancel Appointment”. A confirmation message shows. The user confirms. |

## Use Cases (Expanded Form)

|  |  |  |
| --- | --- | --- |
| **USE CASE #** | 1 | |
| **Goal in Context** | The user wants to cancel their appointment | |
| **Scope & Level** | Primary Task | |
| **Preconditions** | User is already registered and can login | |
| **Success End Condition** | Appointment is cancelled | |
| **Failed End Condition** | Appointment is not cancelled | |
| **Primary/Secondary Actors** | Client | |
| **Trigger** |  | |
| **DESCRIPTION** | **Step** | **Action** |
|  | 1 | Go to landing page |
|  | 2 | Click Appointments |
|  | 3 | Select Appointment to cancel |
|  | 4 | Select “Cancel Appointment” Button |
| **EXTENSIONS** | **Step** | **Branching Action** |
|  | 1 | None |
| **SUB-VARIATIONS** | **Step** | **Branching Action** |
|  | 1 | None |

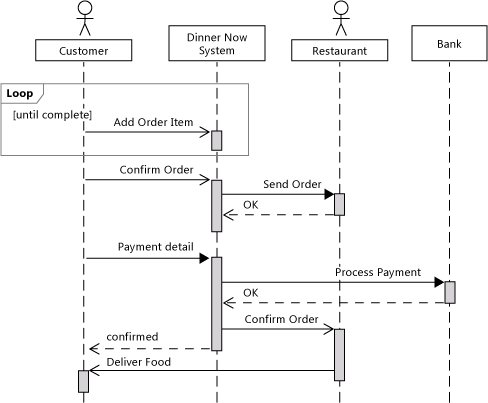
|  |  |
| --- | --- |
| **RELATED INFORMATION** |  |
| **Priority** |  |
| **Performance** |  |
| **Frequency** |  |
| **Channels to actors** |  |
| **OPEN ISSUES** |  |
| **Due Date** |  |
| **Other management information** |  |
| **Superordinates** |  |
| **Subordinates** |  |

## Domain / Concept Model (UML)

TODO

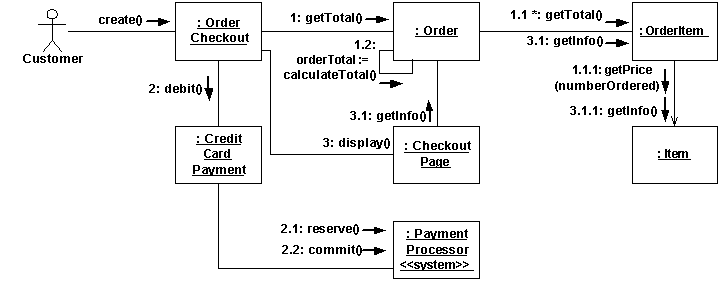
## System Sequence Diagrams (UML)

TODO (example)



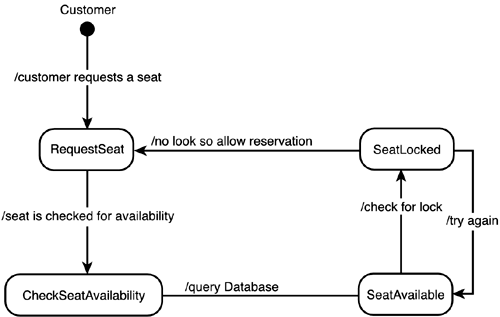
## Collaboration Diagrams (UML)

TODO (example)



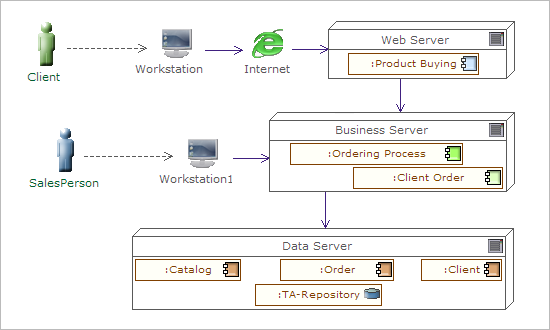
## State Chart Diagrams (UML)

TODO (example)



## Deployment Diagram (UML)

TODO (example)



## Glossary

TODO

# Program Implementation

## Program Structure

TODO

## Program Code / Comments

TODO

# Project Management Section

## Weekly Status Reports

### End of Week 1

* Last Week
  + Studied requirements (1 hour)
  + ER Diagram 1st Draft (1 hour)
  + Considering possible UI design (2 hours)
  + Considering back end design (0.5 hours)
  + Research Entity Framework (3 hour)
* This Week
  + Finalize database design
  + Finalize front-end and back-end design
  + Research Entity Framework
  + Write requirements
  + Finalize Users/Roles
* Challenges
  + Had some slip-ups when analyzing the requirements

### End of Week 2

* Last Week
  + Finalized database design (3 hours)
  + Research Entity Framework (4 hours)
    - Throwing out Entity Framework – Non-functional for .NET 4.0
  + Wrote requirements based upon initial requirements doc (1.5 hours)
  + Finalized Users/Roles (0.5 hours)
  + Finalized front-end framework (0.5 hours)
    - Single Page Application, Angular JS, Bootstrap-UI, Angular-UI, LESS, AJAX-JSON
  + Finalize back-end framework (0.5 hours)
    - Microsoft Web API
    - Layered approach (Controller / Business Layer / Data Layer)
    - Data Layer will utilize inline SQL
  + Linked app code to Github for source control and project management
* This Week
  + Begin implementing features
    - Establish UI Framework and tooling
    - Establish back end framework layers and achieve Oracle connection
    - Landing Page
    - Logo
    - Login / Security
    - Navigation
    - Encryption / Decryption of passwords and Tax ID (Social Security Number)
* Challenges
  + Entity Framework
    - Struggled a lot trying to get it to work despite many tutorials working successfully
    - Research shows that Oracle and Entity Framework don’t play nicely in .NET 4.0

### End of Week 3

* Last Week
* This Week

## Activities And Time

TODO

## Total Time Spent

TODO

# Project Management

## Difficulties Encountered

TODO

## Technical Reports Used To Solve Difficulties

TODO

## Other Technical Information

TODO

# Electronic Documentation

## Computer Disks And All Materials On CD

TODO

## Project Materials

TODO

## Presentation Materials (Powerpoints, etc)

TODO