**Solution Development Plan**

Solution: PatientsAppointmentsDB\_JustinTran

Owner: Justin Tran

Date: March 11th, 2020

Change Log

|  |  |  |
| --- | --- | --- |
| Who | When | What |
| Justin Tran | February 25th 2020 | Created a metadata spreadsheet and an ERD planning out the database design |
| Justin Tran | March 3rd 2020 | Created a SQL script that would design a database with views and stored procedures |
| Justin | March 10th 2020 | Input sample data into the database and created several business intelligence reports based on the sample data |

# **Summary**

This is a summary document for a database design. The database is based on an application that will allow patients to schedule appointments with doctors at different clinics. The database links doctors to clinics to patients all through an appointment.

# **Expectations**

1. The solution will store and present verified data.
2. The solution will allow for simple ad hoc queries.
3. The solution must include reports and a data entry application that is easy to use.
4. The solution should be simple to keep development and maintenance costs at a minimum.
5. A working prototype should be available in a short period of time.

OpenIssues

|  |  |  |
| --- | --- | --- |
| Who | When | What |
| N/A |  |  |
| N/A |  |  |

Closed Issues

|  |  |  |
| --- | --- | --- |
| Who | When | What |
| Justin Tran | March 15th 2020 | The entire database seems to be functioning as intended |

# **Solution Naming Conventions**

## *Database (SQL Server)*

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention | Example | Description |
| Table | TableName | Doctors | A table used to hold data |
| View | vTableName | vDoctors | A saved select statement that presents data |
| Stored Procedure | pTransactionTableName | pInsDoctors | A set of saved statements that process data |
| Function | fDescriptionOfResult | fLookMaxIDInTable | A saved select statement that provides data |

## *ETL Processing Objects*

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention | Example | Description |
| Table | ETLTableNameStaging | ETLDoctorsStaging | Table used to hold staging data |
| View | vETLTableName | vDoctors | View with transformation logic |
| Stored Procedure | pETLDescription | pETLFillDoctors | Procedure with processing and transformation logic |
| Function | fETLDescriptionOfResult | fLookMaxIDInTable | Function with transformation logic |

## *Report Objects*

|  |  |  |  |
| --- | --- | --- | --- |
| Object Type | Convention | Example | Description |
| Data Source | ObjectTypeNameOfSource | DataSourceDatabase | A DataSource that is part on a individual report |
| Report Component | ObjectTypeNameOfSubject | TableOrdersByDoctors | A Table like report component |

# Data Objects

This is a list of all the known data objects

## Data Files

### File Name: SQL\_Script\_of\_Sample\_Data.sql

Description: Contains sample patient, doctor, clinic, and appointment data in sql insert statements. To be used for importing sample data.

## OLTP Database Tables

### Table Name: Doctors

Description: Contains doctor data

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| DoctorID | int | 1 | Identity |
| DoctorFirstName | nvarchar(100) | Donald |  |
| DoctorLastName | nvarchar(100) | Obama |  |
| DoctorPhoneNumber | nvarchar(100) | 123-456-7890 | Check to match phone pattern xxx-xxx-xxxx |
| DoctorAddress | nvarchar(100) | 1234 Street Ave. |  |
| DoctorCity | nvarchar(100) | Seattle |  |
| DoctorState | nvarchar(2) | WA |  |
| DoctorZipCode | nvarchar(10) | 12345 | Check to match Zip Code Pattern xxxxx |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| DoctorID | Yes | No | Yes | No | Yes | Yes |
| DoctorFirstName | No | No | Yes | No | No | No |
| DoctorLastName | No | No | Yes | No | No | No |
| DoctorPhoneNumber | No | No | Yes | Yes | No | No |
| DoctorAddress | No | No | Yes | No | No | No |
| DoctorCity | No | No | Yes | No | No | No |
| DoctorState | No | No | Yes | No | No | No |
| DoctorZipCode | No | No | Yes | Yes | No | No |

### Table Name: Patients

Description: Contains Patient data

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| PatientID | int | 1 | Identity |
| PatientFirstName | nvarchar(100) | Barack |  |
| PatientLastName | nvarchar(100) | Trump |  |
| PatientPhoneNumber | nvarchar(100) | 111-222-3333 | Check to match phone pattern xxx-xxx-xxxx |
| PatientAddress | nvarchar(100) | 4321 Avenue St. |  |
| PatientCity | nvarchar(100) | Bellevue |  |
| PatientState | nvarchar(2) | WA |  |
| PatientZipCode | nvarchar(10) | 54321 | Check to match Zip Code Pattern xxxxx |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| PatientID | Yes | No | Yes | No | Yes | Yes |
| PatientFirstName | No | No | Yes | No | No | No |
| PatientLastName | No | No | Yes | No | No | No |
| PatientPhoneNumber | No | No | Yes | Yes | No | No |
| PatientAddress | No | No | Yes | No | No | No |
| PatientCity | No | No | Yes | No | No | No |
| PatientState | No | No | Yes | No | No | No |
| PatientZipCode | No | No | Yes | Yes | No | No |

### Table Name: Clinics

Description: Contains Clinic data

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| ClinicID | int | 1 | Identity |
| ClinicName | nvarchar(100) | McDonalds Clinic | Unique |
| ClinicPhoneNumber | nvarchar(100) | 098-765-4321 | Check to match phone pattern xxx-xxx-xxxx |
| ClinicAddress | nvarchar(100) | 1234 Main Boulevard |  |
| ClinicCity | nvarchar(100) | Tacoma |  |
| ClinicState | nvarchar(2) | WA |  |
| ClinicZipCode | nvarchar(1) | 10101 | Check to match Zip Code Pattern xxxxx |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| ClinicID | Yes | No | Yes | No | Yes | Yes |
| ClinicName | No | No | Yes | No | Yes | No |
| ClinicPhoneNumber | No | No | Yes | Yes | No | No |
| ClinicAddress | No | No | Yes | No | No | No |
| ClinicCity | No | No | Yes | No | No | No |
| ClinicState | No | No | Yes | No | No | No |
| ClinicZipCode | No | No | Yes | Yes | No | No |

### Table Name: Appointments

Description: Contains Appointment data

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| AppointmentID | int | 1 | Identity |
| AppointmentDateTime | datetime | 01/01/2020 10:00 |  |
| AppointmentPatientID | int | 1 | References Patients PatientID |
| AppointmentDoctorID | int | 1 | References Doctors DoctorID |
| AppointmentClinicID | int | 1 | References Clinics ClinicID |

Constraints

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Column Name | Primary Key | Foreign Key | Not Null | Check | Unique | Default |
| AppointmentID | Yes | No | Yes | No | Yes | Yes |
| AppointmentDateTime | No | No | Yes | No | Yes | No |
| AppointmentPatientID | No | Yes | Yes | Yes | No | No |
| AppointmentDoctorID | No | Yes | Yes | No | No | No |
| AppointmentClinicID | No | Yes | Yes | No | No | No |

## *OLTP Views*

### View Name: vDoctors

Description: Abstracts data from the Doctors table

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| DoctorID | int | 1 |  |
| DoctorFirstName | nvarchar(100) | Donald |  |
| DoctorLastName | nvarchar(100) | Obama |  |
| DoctorPhoneNumber | nvarchar(100) | 123-456-7890 |  |
| DoctorAddress | nvarchar(100) | 1234 Street Ave. |  |
| DoctorCity | nvarchar(100) | Seattle |  |
| DoctorState | nvarchar(2) | WA |  |
| DoctorZipCode | nvarchar(10) | 12345 |  |

### View Name: vPatients

Description: Abstracts data from the Patients table

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| PatientID | int | 1 |  |
| PatientFirstName | nvarchar(100) | Barack |  |
| PatientLastName | nvarchar(100) | Trump |  |
| PatientPhoneNumber | nvarchar(100) | 111-222-3333 |  |
| PatientAddress | nvarchar(100) | 4321 Avenue St. |  |
| PatientCity | nvarchar(100) | Bellevue |  |
| PatientState | nvarchar(2) | WA |  |
| PatientZipCode | nvarchar(10) | 54321 |  |

### View Name: vClinics

Description: Abstracts data from the Clinics table

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| ClinicID | int | 1 |  |
| ClinicName | nvarchar(100) | McDonalds Clinic |  |
| ClinicPhoneNumber | nvarchar(100) | 098-765-4321 |  |
| ClinicAddress | nvarchar(100) | 1234 Main Boulevard |  |
| ClinicCity | nvarchar(100) | Tacoma |  |
| ClinicState | nvarchar(2) | WA |  |
| ClinicZipCode | nvarchar(1) | 10101 |  |

### View Name: vAppointments

Description: Abstracts data from the Appointments table

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Data Type | Example | Notes |
| AppointmentID | int | 1 |  |
| AppointmentDateTime | datetime | 01/01/2020 10:00 |  |
| AppointmentPatientID | int | 1 |  |
| AppointmentDoctorID | int | 1 |  |
| AppointmentClinicID | int | 1 |  |

### View Name: vAppointmentsbyPatientsDoctorsAndClinics

Description: Abstracts data from Appointments, Patients, Doctors, and Clinics tables and joins them into one report table

|  |  |  |  |
| --- | --- | --- | --- |
| Column Name | Source | Example | Notes |
| AppointmentID | Appointments.AppointmentID | 1 | Join Column |
| AppointmentDate | Appointments.AppointmentDateTime | 01/01/2020 |  |
| AppointmentTime | Appointments.AppointmentDateTime | 10:00 |  |
| PatientID | Patients.PatientID | 1 | Join Column (with Appoinments.AppointmentPatientID) |
| PatientName | Patients.PatientFirstName, Patients.PatientLastName | Barack Obama |  |
| PatientPhoneNumber | Patients.PhoneNumber | 111-222-3333 |  |
| PatientAddress | Patients.PatientAddress | 4321 Avenue St. |  |
| PatientCity | Patients.PatientCity | Bellevue |  |
| PatientState | Patients.PatientState | WA |  |
| PatientZipCode | Patients.PatientZipCode | 54321 |  |
| DoctorID | Doctors.DoctorID | 1 | Join Column (with Appoinments.AppointmentDoctorID) |
| DoctorName | Doctors.DoctorFirstName, Doctors.DoctorLastName | Justin Tan |  |
| DoctorPhoneNumber | Doctors.PhoneNumber | 123-456-7890 |  |
| DoctorAddress | Doctors.DoctorAddress | 123 Main St. |  |
| DoctorCity | Doctors.DoctorCity | Seattle |  |
| DoctorState | Doctors.DoctorState | WA |  |
| DoctorZipCode | Doctors.DoctorZipCode | 12345 |  |
| ClinicID | Clinics.ClinicID | 1 | Join Column (with Appoinments.AppointmentClinicID) |
| ClinicName | Clinics.ClinicName | McDonalds Clinic |  |
| ClinicPhoneNumber | Clinics.PhoneNumber | 098-765-4321 |  |
| ClinicAddress | Clinics.ClinicAddress | 1234 Main Boulevard |  |
| ClinicCity | Clinics.ClinicCity | Tacoma |  |
| ClinicState | Clinics.ClinicState | WA |  |
| ClinicZipCode | Clinics.ClinicZipCode | 10101 |  |

## *OLTP Stored Procedures*

### Procedure Name: pInsDoctors

Description: Abstracts data inserts for the Doctors table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| DoctorID | int | 1 | Output |
| DoctorFirstName | nvarchar(100) | Donald | Input |
| DoctorLastName | nvarchar(100) | Obama | Input |
| DoctorPhoneNumber | nvarchar(100) | 123-456-7890 | Input |
| DoctorAddress | nvarchar(100) | 1234 Street Ave. | Input |
| DoctorCity | nvarchar(100) | Seattle | Input |
| DoctorState | nvarchar(2) | WA | Input |
| DoctorZipCode | nvarchar(10) | 12345 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pUpdDoctors

Description: Abstracts data updates for the Doctors table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| DoctorID | int | 1 | Input |
| DoctorFirstName | nvarchar(100) | Donald | Input |
| DoctorLastName | nvarchar(100) | Obama | Input |
| DoctorPhoneNumber | nvarchar(100) | 123-456-7890 | Input |
| DoctorAddress | nvarchar(100) | 1234 Street Ave. | Input |
| DoctorCity | nvarchar(100) | Seattle | Input |
| DoctorState | nvarchar(2) | WA | Input |
| DoctorZipCode | nvarchar(10) | 12345 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pDelDoctors

Description: Abstracts data deletes for the Doctors table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| DoctorID | int | 1 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pInsPatients

Description: Abstracts data inserts for the Patients table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| PatientID | int | 1 | Output |
| PatientFirstName | nvarchar(100) | Barack | Input |
| PatientLastName | nvarchar(100) | Trump | Input |
| PatientPhoneNumber | nvarchar(100) | 111-222-3333 | Input |
| PatientAddress | nvarchar(100) | 4321 Avenue St. | Input |
| PatientCity | nvarchar(100) | Bellevue | Input |
| PatientState | nvarchar(2) | WA | Input |
| PatientZipCode | nvarchar(10) | 54321 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pUpdPatients

Description: Abstracts data updates for the Patients table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| PatientID | int | 1 | Input |
| PatientFirstName | nvarchar(100) | Barack | Input |
| PatientLastName | nvarchar(100) | Trump | Input |
| PatientPhoneNumber | nvarchar(100) | 111-222-3333 | Input |
| PatientAddress | nvarchar(100) | 4321 Avenue St. | Input |
| PatientCity | nvarchar(100) | Bellevue | Input |
| PatientState | nvarchar(2) | WA | Input |
| PatientZipCode | nvarchar(10) | 54321 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pDelPatients

Description: Abstracts data deletes for the Patients table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| PatientID | int | 1 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pInsClinics

Description: Abstracts data inserts for the Clinics table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| ClinicID | int | 1 | Output |
| ClinicName | nvarchar(100) | McDonalds Clinic | Input |
| ClinicPhoneNumber | nvarchar(100) | 098-765-4321 | Input |
| ClinicAddress | nvarchar(100) | 1234 Main Boulevard | Input |
| ClinicCity | nvarchar(100) | Tacoma | Input |
| ClinicState | nvarchar(2) | WA | Input |
| ClinicZipCode | nvarchar(1) | 10101 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pUpdClinics

Description: Abstracts data updates for the Clinics table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| ClinicID | int | 1 | Input |
| ClinicFirstName | nvarchar(100) | Donald | Input |
| ClinicLastName | nvarchar(100) | Obama | Input |
| ClinicPhoneNumber | nvarchar(100) | 123-456-7890 | Input |
| ClinicAddress | nvarchar(100) | 1234 Street Ave. | Input |
| ClinicCity | nvarchar(100) | Seattle | Input |
| ClinicState | nvarchar(2) | WA | Input |
| ClinicZipCode | nvarchar(10) | 12345 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pDelClinics

Description: Abstracts data deletes for the Clinics table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| ClinicID | int | 1 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pInsAppointments

Description: Abstracts data inserts for the Appointments table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| AppointmentID | int | 1 | Output |
| AppointmentDateTime | datetime | 01/01/2020 10:00 | Input |
| AppointmentPatientID | int | 1 | Input |
| AppointmentDoctorID | int | 1 | Input |
| AppointmentClinicID | int | 1 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pUpdAppointments

Description: Abstracts data updates for the Appointments table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| AppointmentID | int | 1 | Input |
| AppointmentDateTime | datetime | 01/01/2020 10:00 | Input |
| AppointmentPatientID | int | 1 | Input |
| AppointmentDoctorID | int | 1 | Input |
| AppointmentClinicID | int | 1 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

### Procedure Name: pDelAppointments

Description: Abstracts data deletes for the Appointments table

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter Name | Data Type | Example | Direction |
| AppointmentID | int | 1 | Input |

Return Codes:

1 = Insert succeeded

-1 = Insert failed

## *OLTP Functions*

None required

# **ETL Objects**

This is a list of all the known ETL objects

## *ETL Staging Tables*

None required

## *ETL Views*

None required

## *ETL Stored Procedures*

None required

## *ETL Functions*

None required

# Reporting Objects

This is a list of all the known Report objects

## Excel Reports

### Report Name: Info330\_ExcelReport.xlsx

Description: Analyzes one facet of information from the database

|  |  |  |
| --- | --- | --- |
| Column | Example | Description |
| Number of Doctor Appointments by State | Washington has 10 schedule doctored appointments | Pie chart showing how many appointments there are per state. Also contains raw data in table format. More detailed explanation in the Excel file. |

## Tableau Reports

### Report Name: Info\_330\_Tableau\_Screenshot.PNG

Description: Contains Tableau screenshot showing maps

|  |  |  |
| --- | --- | --- |
| Column | Example | Description |
| Map with patient locations | U.S. map showing where patients are | See where the patients are located geographically. Compare and contrast with clinic map to see where clinics can meet patient demand and where clinics cannot. More detailed explanation in screenshot. In screenshot format due to Tableau restricting free user save permissions. |
| Map with clinic locations | U.S. map showing where clinics are | See where the clinics are located geographically. Compare and contrast with patients map to see where patients physically are and whether or not they have access to clinics within a reasonable distance. More detailed explanation in screenshot. In screenshot format due to Tableau restricting free user save permissions. |

## Power BI Reports

### Report Name: Info\_330\_Power\_BI.pbix

Description: Uses Power BI to analyze information

|  |  |  |
| --- | --- | --- |
| Column | Example | Description |
| Patients by City | Seattle has 10 patients | Can see which cities have more patients than others, compare cities by number of patients. More detailed explanation in Power BI file. |
| Appointments by Doctor | Doctor Barack Obama has 3 appointments | Can see how many appointments one doctor has, compare different doctors and their appointments. More detailed explanation in Power BI file. |