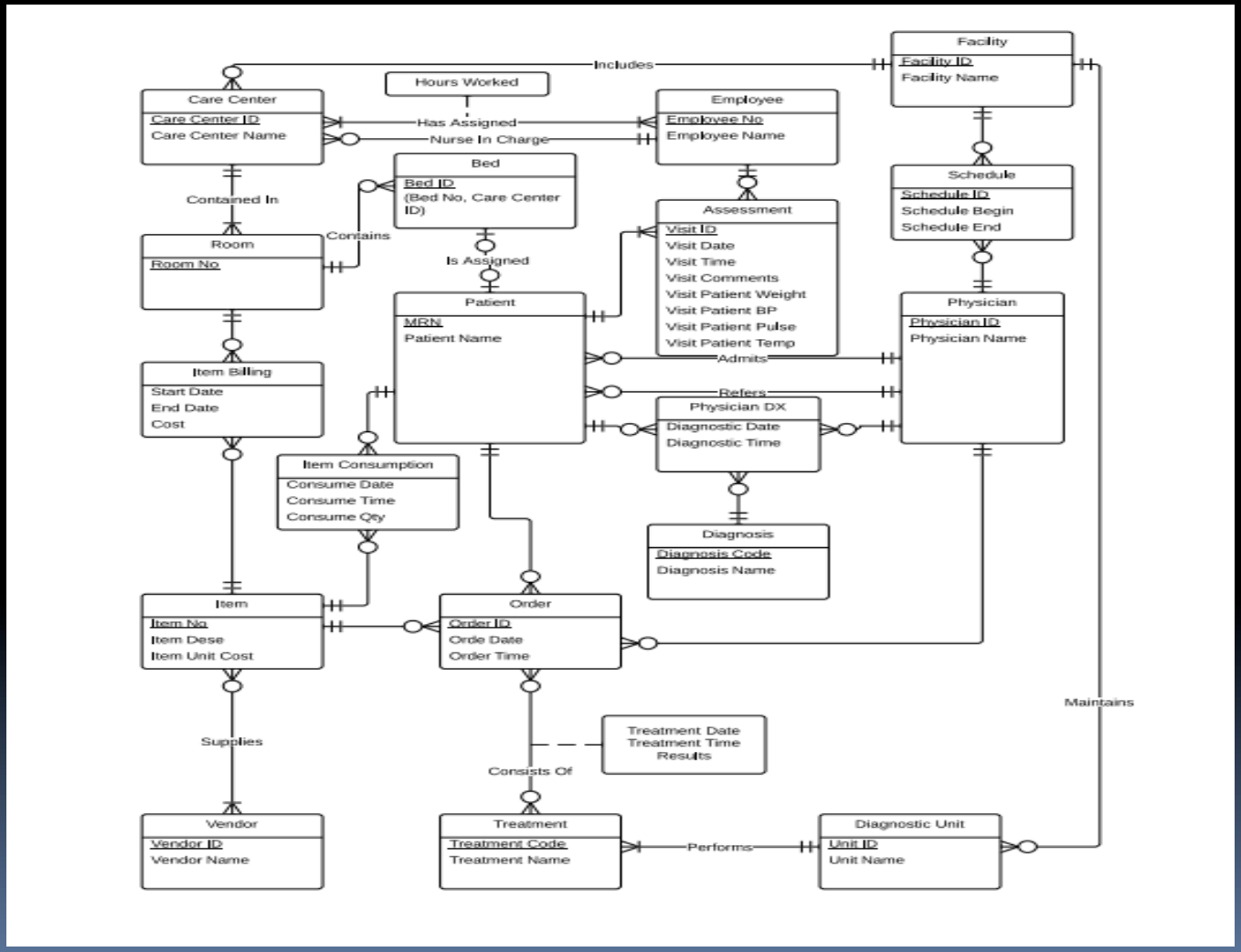
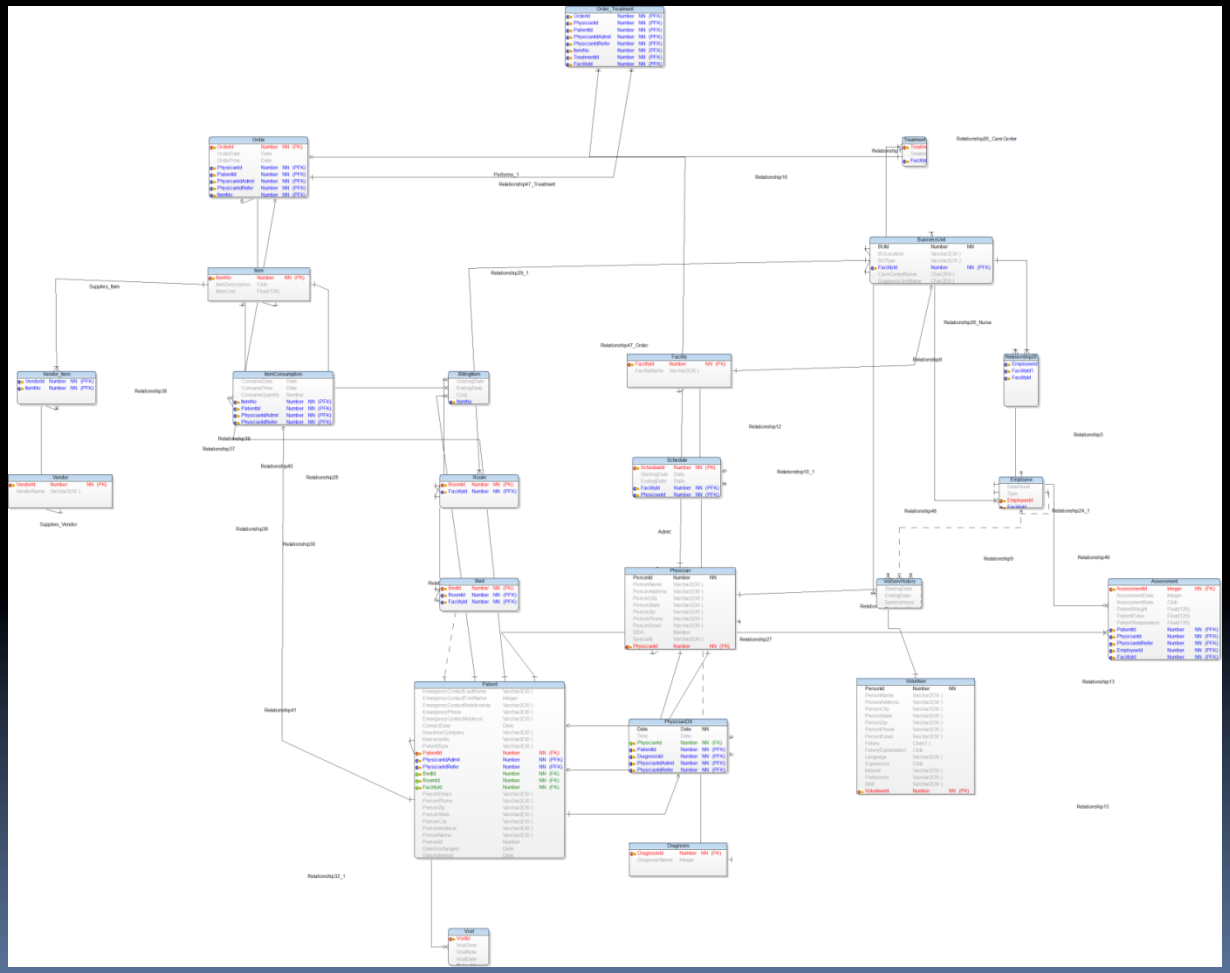
Albert Carter
Di Huang
Zihang Pu
Cong Wu

MVCH DATABASE

ER Diagram


Facility
Facility ID
Facility Name
Includes
Hours Worked
Care Center
Care Center ID
Care Center Name
Has Assigned
Nurse In Charge
Employee
Employee No
Employee Name
Bed
Bed ID
(Bed No, Care Center ID)
Schedule
Schedule ID
Schedule Begin
Schedule End
Contained In
Contains
Assessment
Visit ID
Visit Date
Visit Time
Visit Comments
Visit Patient Weight
Visit Patient BP
Visit Patient Pulse
Visit Patient Temp
Room
Room No
Is Assigned
Patient
MRN
Patient Name
Physician
Physician ID
Physician Name
Admits
Refers
Item Billing
Start Date
End Date
Cost
Physician DX
Diagnostic Date
Diagnostic Time
Item Consumption
Consume Date
Consume Time
Consume Qty
Diagnosis
Diagnosis Code
Diagnosis Name
Item
Item No
Item Dese
Item Unit Cost
Order
Order ID
Orde Date
Order Time
Maintains
Supplies
Treatment Date
Treatment Time
Results
Consists Of
Vendor
Vendor ID
Vendor Name
Treatment
Treatment Code
Treatment Name
Performs
Diagnostic Unit
Unit ID
Unit Name

EER Diagram



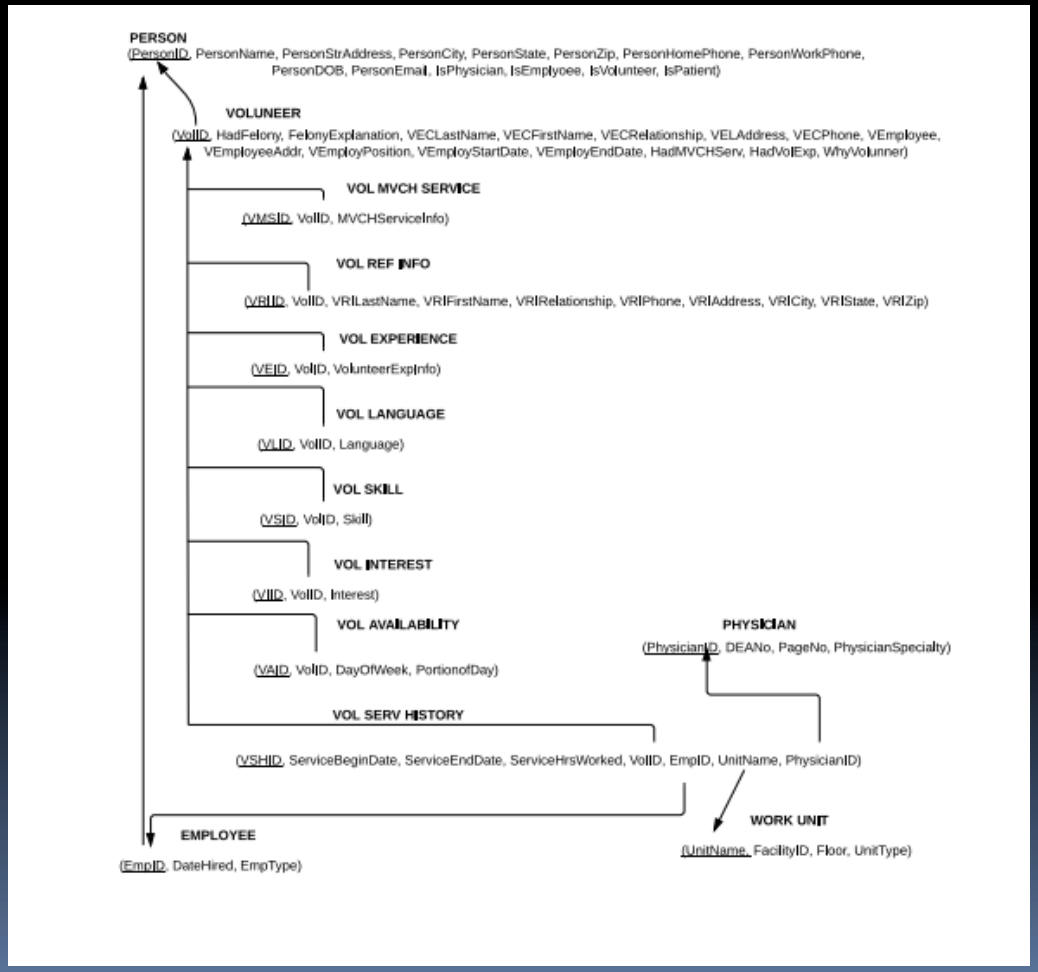
Business Rules Snippets

- A DIAGNOSTIC UNIT performs one or many TREATMENTs.
- A TREATMENT is performed by only one DIAGNOSTIC UNIT.
- A FACILITY can have zero, one or many CARE CENTERs.
- A CARE CENTER is part of one and only one FACILITY.
- A FACILITY can have zero, one or many DIAGNOSTIC UNITs.
- A DIAGNOSTIC UNIT is part of only one FACILITY.
- A CARE CENTER has one or many EMPLOYEEs.
- A CARE CENTER has one EMPLOYEE assigned as morning nurse in charge.
- A CARE CENTER has one EMPLOYEE assigned as nighttime nurse in charge.
- A CARE CENTER contains one or many ROOMs.
- A ROOM is inside only one CARE CENTER.
- A ROOM has zero, one, or many BEDs.
- A BED is inside only one ROOM.

Relational Schema

- DIAGNOSTIC_UNIT(DUnitName)
- TREATMENT(TrtID, TrtName, *DUnitName*)
-
- INSURANCE_COMPANY (InsuranceNo, InsName, InsAddress, InsPhone)
- FACILITY (FacID, FacName)
-
- PERSON(PID, PName, PDOB, PEmail, PAdd1, PAdd2, PCity, PState, PZip, PHomePhone, PWorkPhone, IsPhysician, IsPatient, IsEmployee, IsVolunteer)
- PHYSICIAN (PhysicianID, CellNo, PagerNo, DEANo, Specialty)
- PATIENT (PatientID, *AdmitPhysician, ReferPhysician, InsuranceNo, EmergencyPersonID,* EmergencyPersonRelation, InsFName, InsLName, OutInPatient,
- RESIDENT (RPatientID, *BedNo, RoomNo*, AdmitDate, DischargeDate)
- OUTPATIENT(OPatientID)
- NURSE (NurseID, CertDegree, StateLicenseNo, NurseSpeciality, NurseType)
- RN (RNID)
- LN (LNID, Supervisor)
- FIELD_CERTIFICATION (FCID, NurseID, FCDescription)
-
-

Functional Dependencies

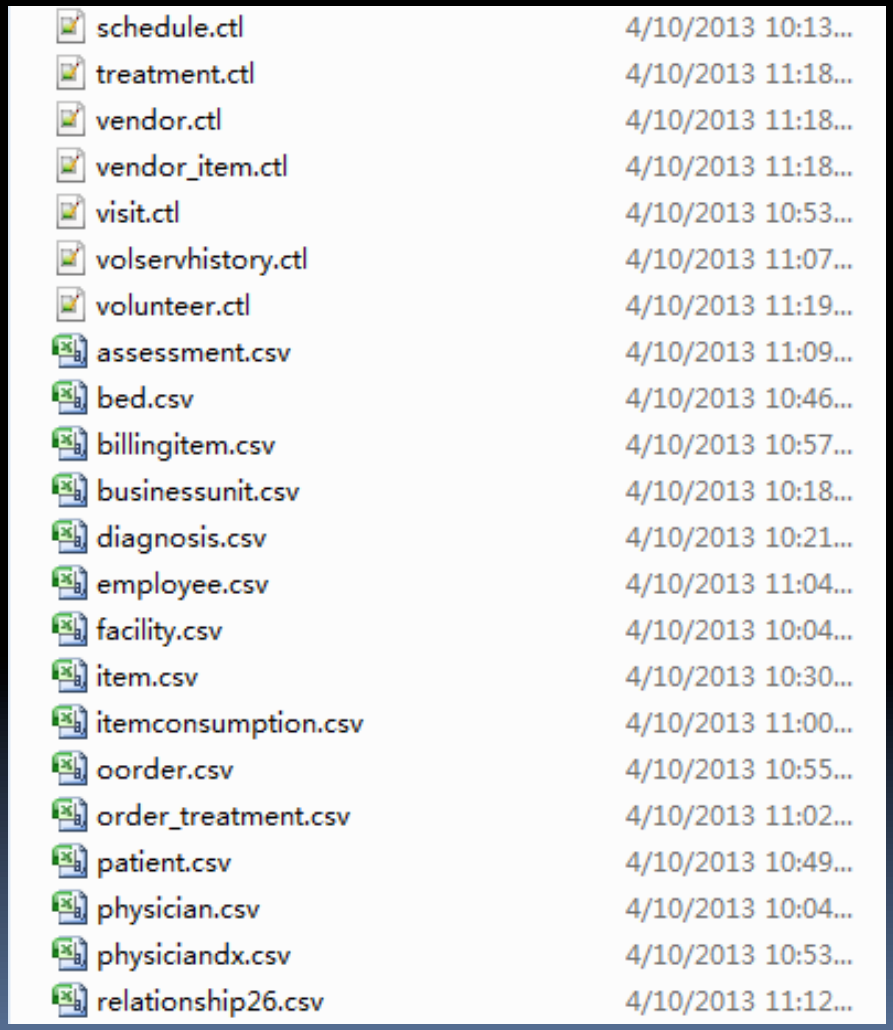


SQL table creation code (creation.sql)

```
CREATE TABLE Patient(
 ...
 InsuranceNo Varchar2(30 ),
 PatientType Varchar2(30 ) CONSTRAINT ValidValuesPatientType
        CHECK ((PatientType IN ('Outpatient','Resident','Discharged'))),
 PatientId Number NOT NULL,
 PhysicianIdAdmit Number NOT NULL,
 ...
 DateAdmitted Date
);

ALTER TABLE Patient ADD CONSTRAINT Unique_Identifier2 PRIMARY
        KEY (PatientId,PhysicianIdAdmit,PhysicianIdRefer);

CREATE TABLE Physician(
 PersonId Number NOT NULL,
 ...
 Specialty Varchar2(30 ),
 PhysicianId Number NOT NULL
);

ALTER TABLE Physician ADD CONSTRAINT Unique_Identifier3
        PRIMARY KEY (PhysicianId);
```

```
CREATE TABLE Employee(
 DateHired Date,
 Type Varchar2(30 ) CONSTRAINT ValidValuesType CHECK ((Type IN
        ('NURSE','STAFF'))),
 ...
 NurseType Varchar2(30 )
     CONSTRAINT ValidValuesNurseType CHECK ((NurseType IN
        ('REGISTERED','LICENSED'))),
 ...
 Degree Varchar2(30 )
);
ALTER TABLE Employee ADD CONSTRAINT Unique_Identifier4
        PRIMARY KEY (EmployeeId,FacilityId);

CREATE TABLE Visit(
 VisitId Number NOT NULL,
 VisitTime Date,
        ...
 PhysicianIdRefer Number NOT NULL
);

ALTER TABLE Visit ADD CONSTRAINT Unique_Identifier10 PRIMARY
        KEY (VisitId,PatientId,PhysicianIdAdmit,PhysicianIdRefer);
```

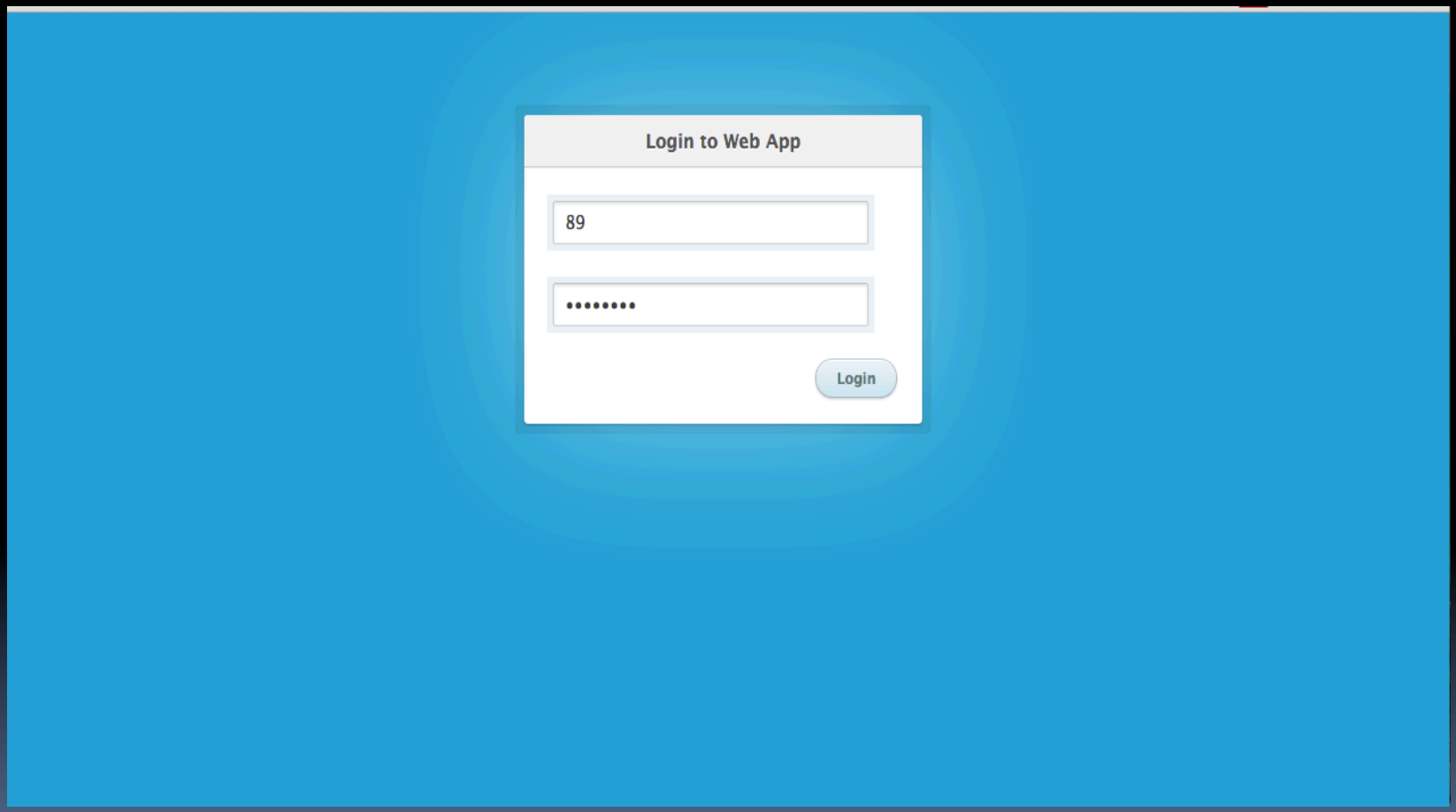
Sqlloader Data&control files



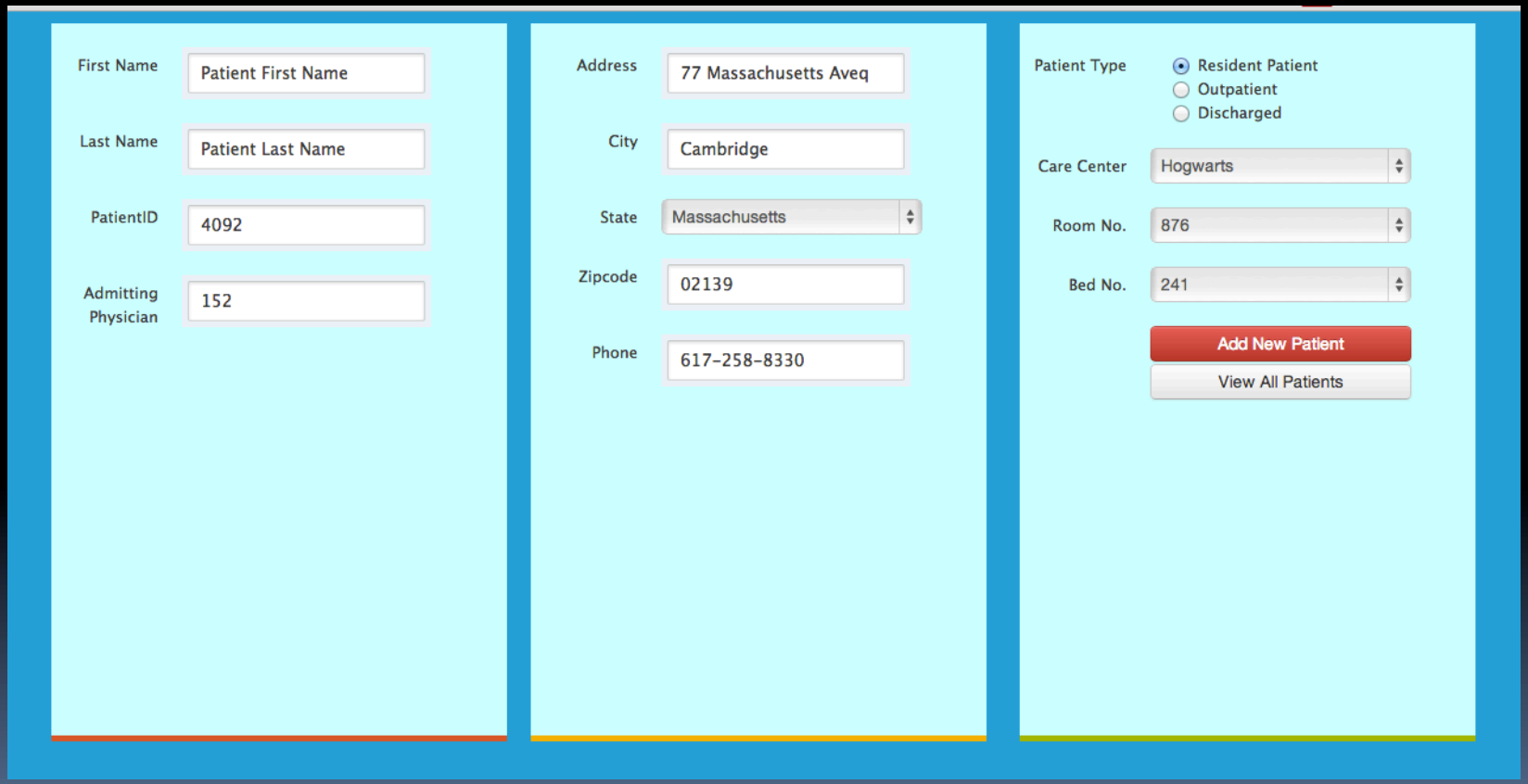
Sql Loader central.bat file

- sqlldr dee/password control=physician.ctl
- sqlldr dee/password control=facility.ctl
- sqlldr dee/password control=schedule.ctl
- sqlldr dee/password control=businessunit.ctl
- sqlldr dee/password control=diagnosis.ctl
- sqlldr dee/password control=treatment.ctl
- sqlldr dee/password control=item.ctl
- sqlldr dee/password control=vendor.ctl
- sqlldr dee/password control=volunteer.ctl
- sqlldr dee/password control=vendor_item.ctl
- sqlldr dee/password control=room.ctl
- sqlldr dee/password control=bed.ctl
- sqlldr dee/password control=patient.ctl
- sqlldr dee/password control=visit.ctl
- sqlldr dee/password control=physiciandx.ctl
- sqlldr dee/password control=oorder.ctl
- sqlldr dee/password control=billingitem.ctl
- sqlldr dee/password control=itemconsumption.ctl
- sqlldr dee/password control=order_treatment.ctl
- sqlldr dee/password control=employee.ctl
- sqlldr dee/password control=volservhistory.ctl
- sqlldr dee/password control=assessment.ctl
- sqlldr dee/password control=relationship26.ctl
- Pause

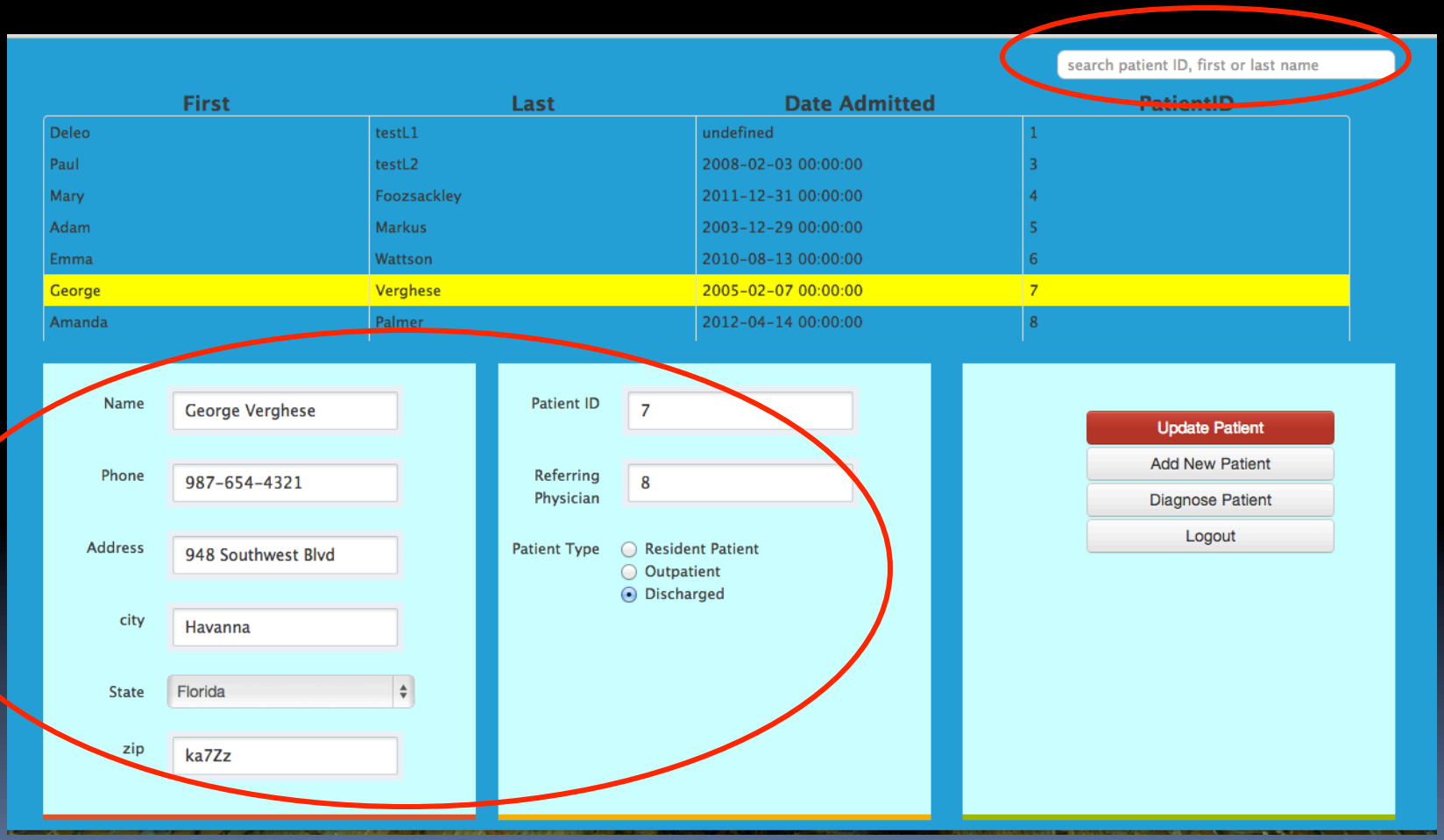
Web Application Login



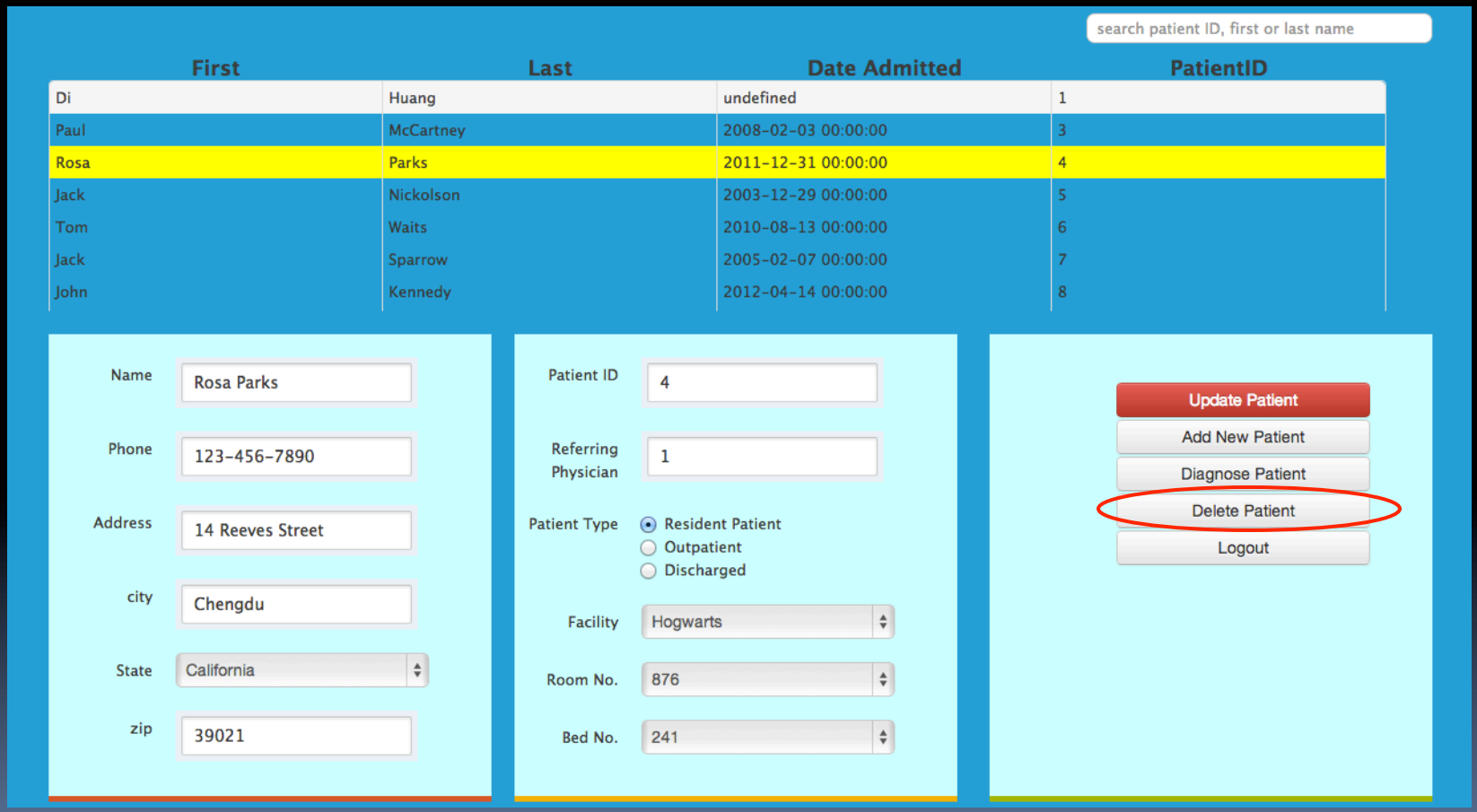
Add (Insert) a Patient



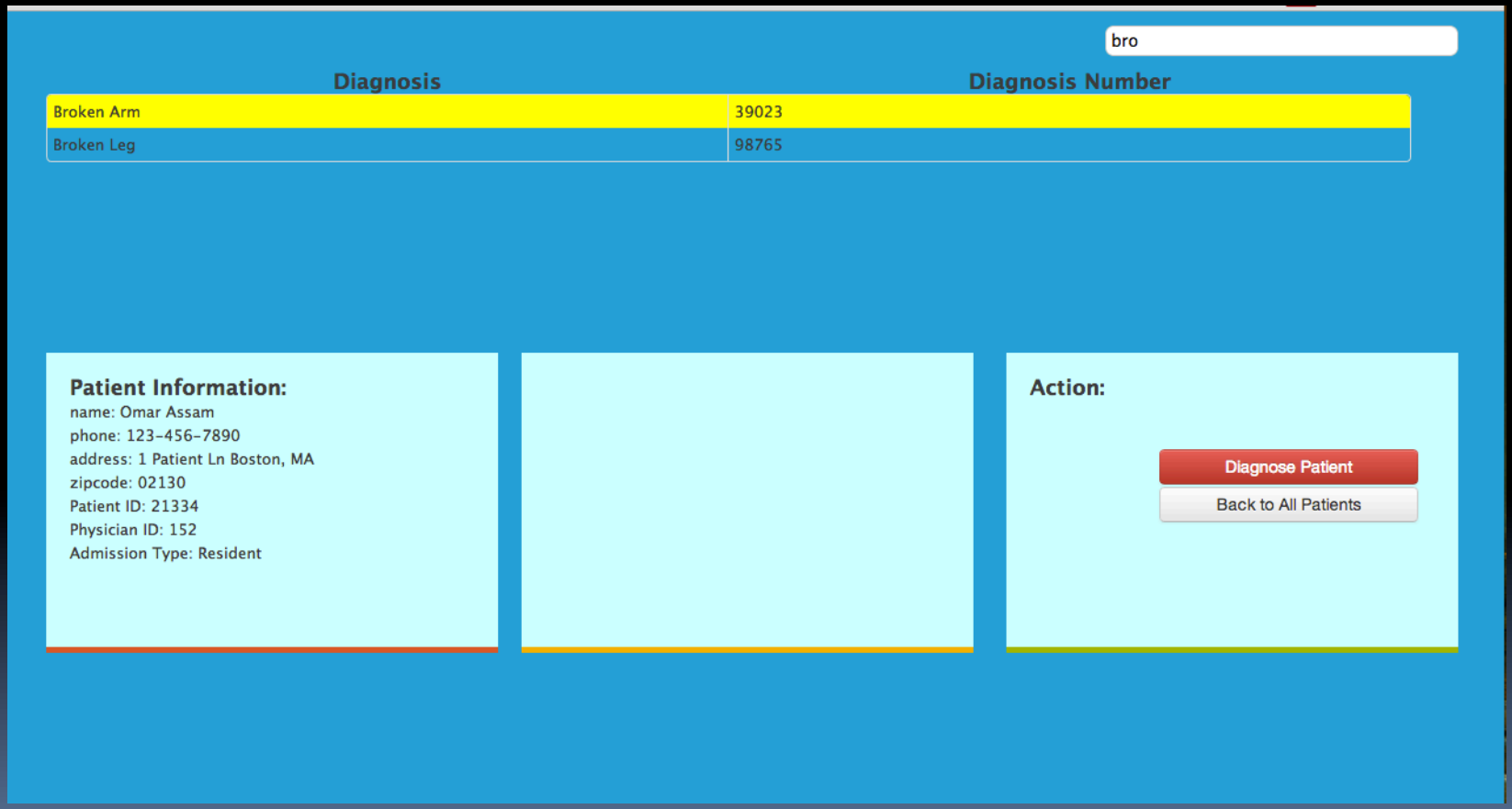
Query & Update Patients



Delete Patient



Diagnose Patients



Technologies & Softwares Used

- Oracle 11g
- SQL Loader
- Toad Data Modeler
- Spring Tool Suite
- CoffeeScript
- Javascript
- jQuery
- HTMl & CSS

Group Work Distribution

Cong

- EER Diagram
- Spring web integration

Al

- Business Rules
- Relational Schema
- Front-end Development

Di

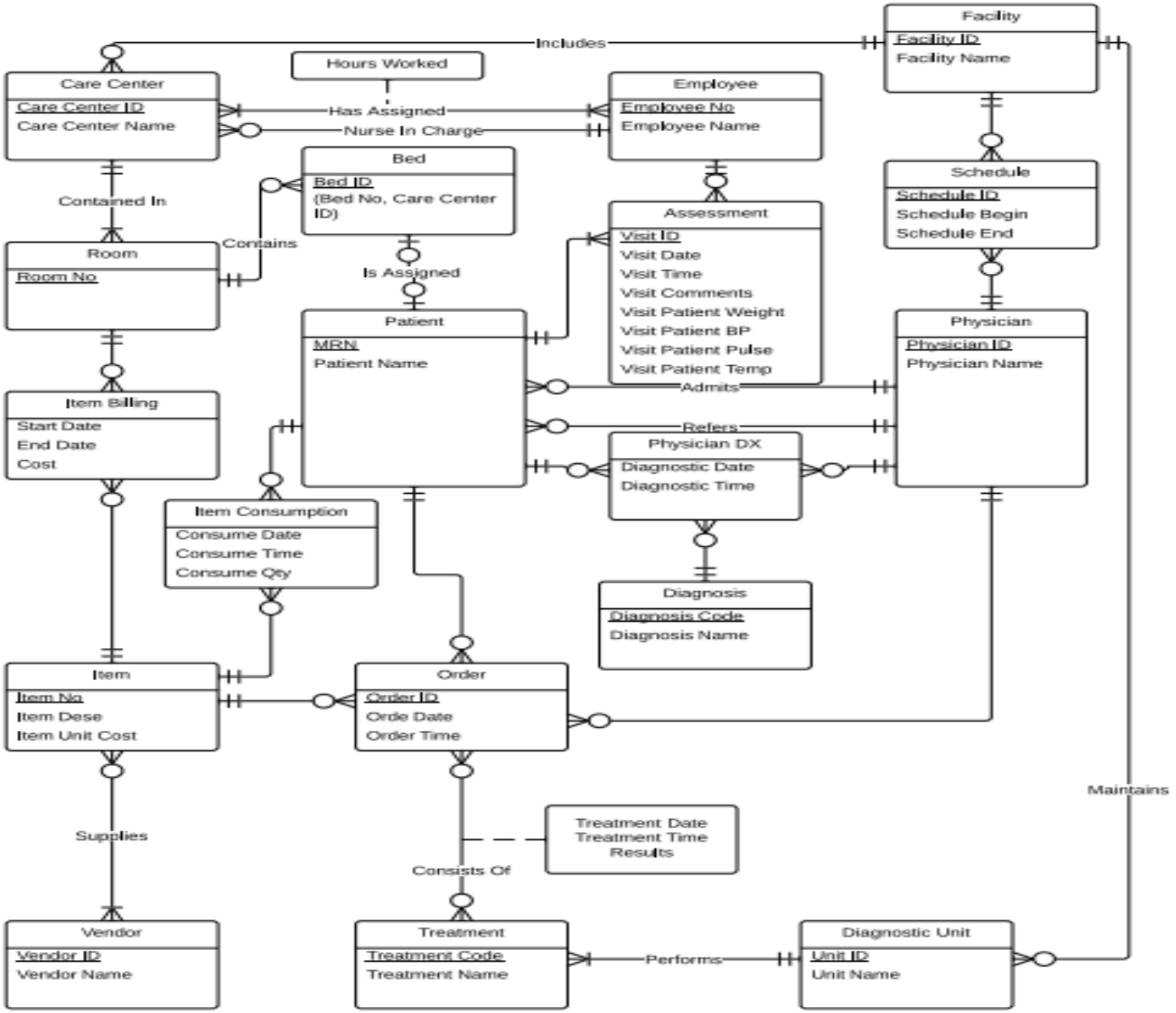
- Table Data Creation
- SQL Loader integration

Zihang

- ER Diagram, Functional Dependencies Development
- JDBC connection

Lessons Learned

- Developing locally is much easier than remote.
- Django with Oracle was too hard. We eventually used Java.
- Learned to configure oracle listener.
- Learned to use Amazon's AWS RDS Learned to use Amazon's AWS Elastic Beanstalk
- Learned that the more complex a database is, the more complex the project becomes.
- Learned that security of the database is extremely time consuming.
- Learned that you should always have a database backup.


Facility
Facility ID
Facility Name
Includes
Hours Worked
Care Center
Care Center ID
Care Center Name
Has Assigned
Nurse In Charge
Employee
Employee No
Employee Name
Bed
Bed ID
(Bed No, Care Center ID)
Schedule
Schedule ID
Schedule Begin
Schedule End
Contained In
Contains
Assessment
Visit ID
Visit Date
Visit Time
Visit Comments
Visit Patient Weight
Visit Patient BP
Visit Patient Pulse
Visit Patient Temp
Room
Room No
Is Assigned
Patient
MRN
Patient Name
Physician
Physician ID
Physician Name
Admits
Refers
Item Billing
Start Date
End Date
Cost
Physician DX
Diagnostic Date
Diagnostic Time
Item Consumption
Consume Date
Consume Time
Consume Qty
Diagnosis
Diagnosis Code
Diagnosis Name
Item
Item No
Item Dese
Item Unit Cost
Order
Order ID
Orde Date
Order Time
Maintains
Supplies
Treatment Date
Treatment Time
Results
Consists Of
Vendor
Vendor ID
Vendor Name
Treatment
Treatment Code
Treatment Name
Performs
Diagnostic Unit
Unit ID
Unit Name