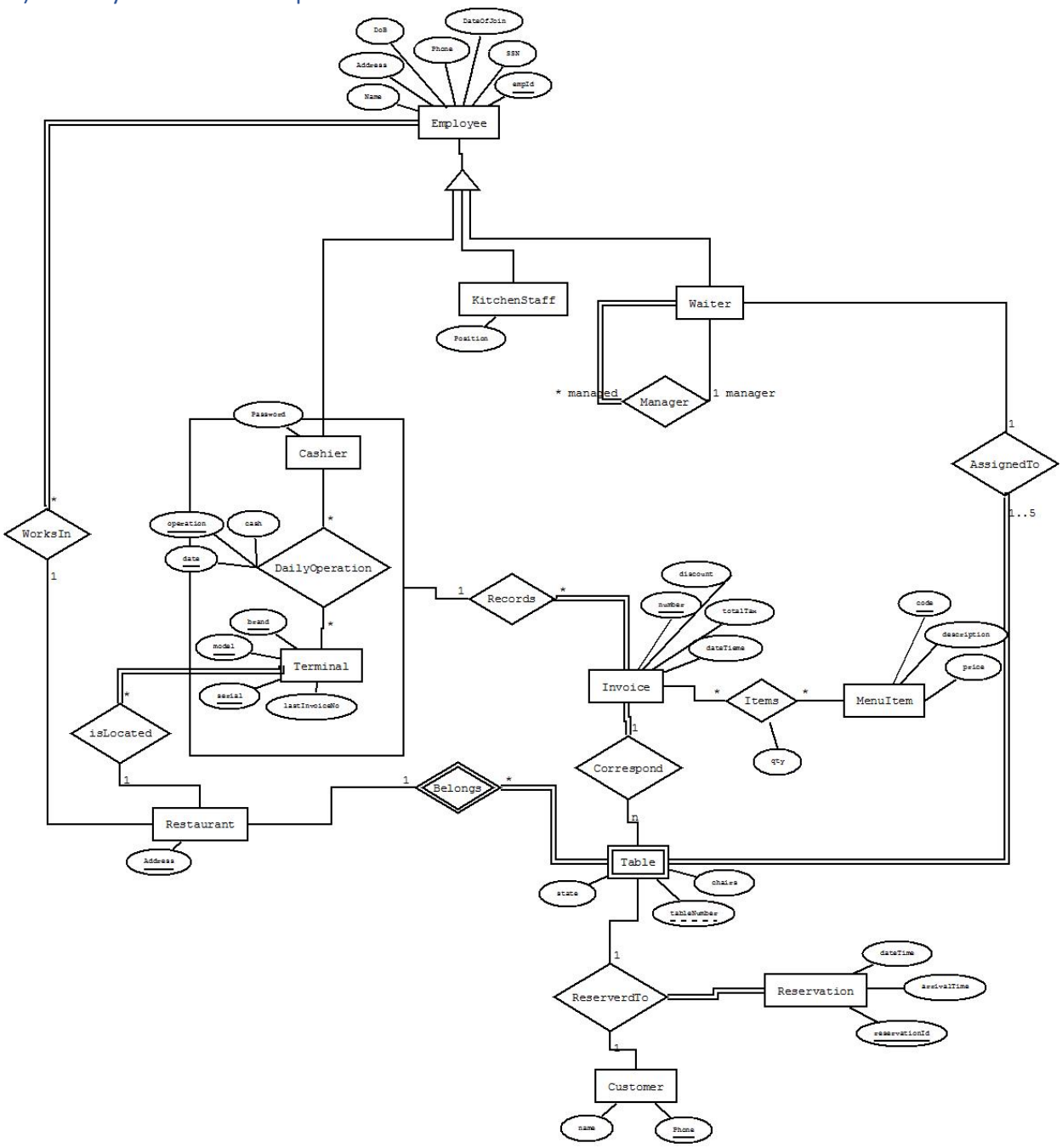
CSCI 5559 - Database Systems
Spring 2017

Assignment 1 - Part a - Solution

1) Entity Relationship Model



Nonstructural Restrictions:

- $\forall t, t \in Table, t.state \in \{open, free, reserved, closed\}$
- $\forall w, t, r, w \in Waiter, t \in Table, r \in Restaurant\ (w, t) \in Assigned \leftrightarrow \exists (w, r) \wedge (w, r) \in WorksIn$

- $\forall t1, t2. t1 \in Employee \wedge t2 \in Employee. t1.ssn = t2.ssh \leftrightarrow t1.empId = t2.empId$

2) Relational Model.

Employee (<u>empId</u>, name, address, DoB, phone, dateOfJoin, SSN, workisInAddress)
$\prod_{worksInAddress}$ (Employee) $\subseteq \prod_{address}$(Restaurant)

Restaurant (<u>Address</u>)

Cashier (<u>empId</u>, password)
$\prod_{empId}$ (Cashier) $\subseteq \prod_{empId}$ (Employee)

KitchenStaff (<u>empId</u>, position)
$\prod_{empId}$ (KitchenStaff) $\subseteq \prod_{empId}$ (Employee)

Waiter (<u>empId</u>, manager)
$\prod_{empId}$ (Waiter) $\subseteq \prod_{empId}$ (Employee)
$\prod_{manager}$ (Waiter) $\subseteq \prod_{empId}$ (Waiter)

Table (<u>address, tableNumber</u>, state, chairs, waiter)
$\prod_{address}$ (Table) $\subseteq \prod_{address}$ (Restaurant)
$\prod_{waiter}$ (Table) $\subseteq \prod_{waiter}$ (Waiter)

Customer (name, <u>phone</u>)

Reservation (dateTime, <u>reservationId</u>, phone, address, tableNumber, arrivalTime)
Phone FK customer
Address, tableNumber FK Table

Terminal (<u>brand model, serial</u>, lastInvoideNo,address)
$\prod_{address}$ (Terminal) $\subseteq \prod_{address}$ (Restaurant)

DailyOperation (<u>empId, brand, model, serial</u>, <u>operation, date</u>, cash)
$\prod_{empId}$ (DailyOperation) $\subseteq \prod_{empId}$ (Cashier)
$\prod_{brand,model,serial}$ (DailyOperation) $\subseteq \prod_{brand,model,serial}$ (Terminal)

Invoice (<u>number</u>, discount, totalTax, invoiceDateTime, empId, brand, model, serial, operation, date, address, tableNumber)
$\prod_{empId,brand,model,serial,operation,date}$ (Invoice) $\subseteq \prod_{empId,brand,model,serial,operation,date}$ (DailyOperation)
$\prod_{address,tableNumber}$ (Invoice) $\subseteq \prod_{address, tableNumber}$ (Table)

Items (<u>number, code</u>, qty)

MenuItem (<u>code</u>, description, price)