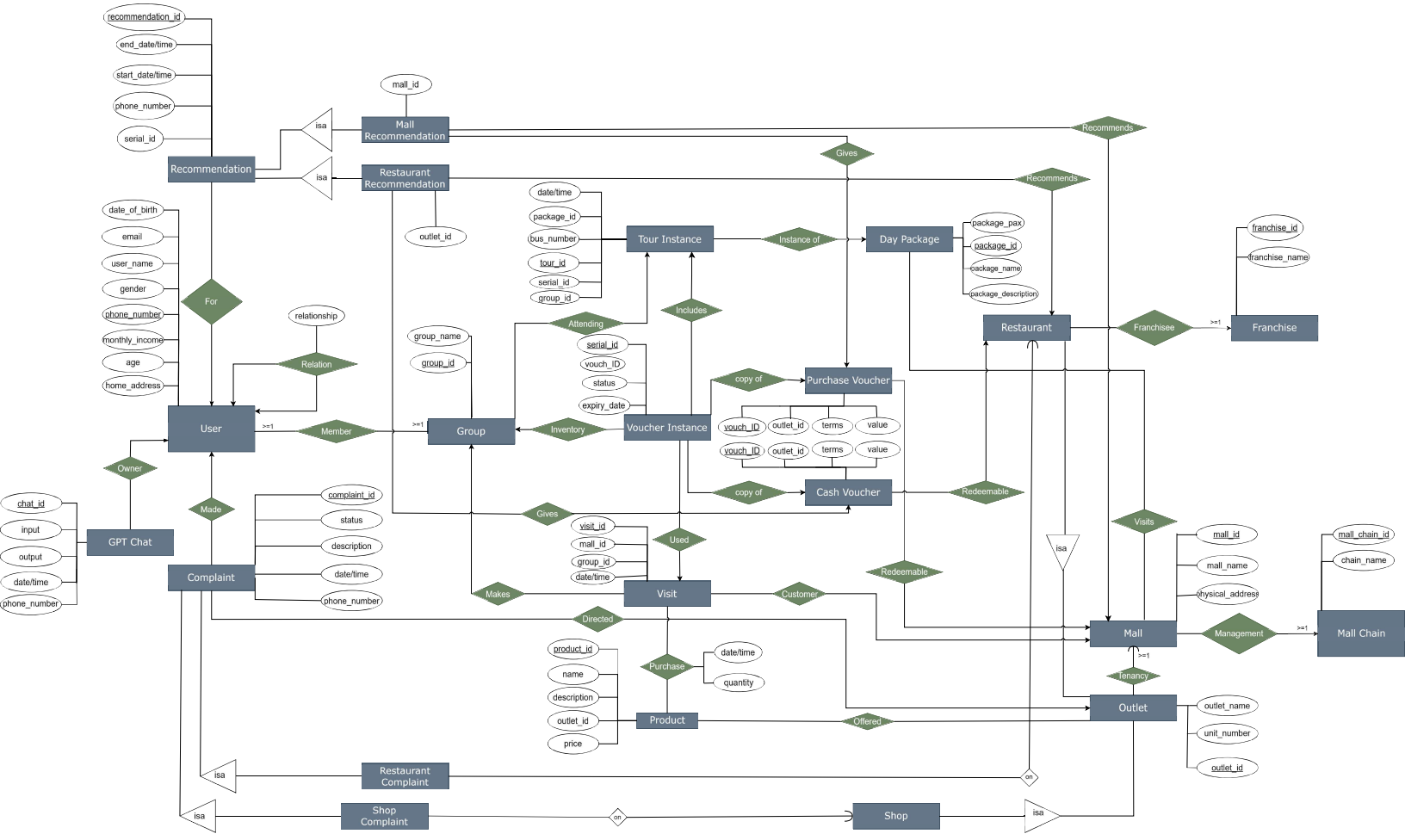
recommendation_id
end_date/time
start_date/time
phone_number
serial_id
Recommendation
isa
Mall Recommendation
mall_id
isa
Restaurant Recommendation
outlet_id
Recommends
Gives
Recommends
date_of_birth
email
user_name
gender
phone_number
monthly_income
age
home_address
For
relationship
Relation
User
>=1
Member
>=1
Group
group_name
group_id
Attending
Inventory
date/time
package_id
bus_number
tour_id
serial_id
group_id
Tour Instance
Includes
Instance of
Day Package
package_pax
package_id
package_name
package_description
Restaurant
Franchisee
>=1
Franchise
franchise_id
franchise_name
serial_id
vouch_ID
status
expiry_date
Voucher Instance
copy of
Purchase Voucher
vouch_ID
outlet_id
terms
value
vouch_ID
outlet_id
terms
value
copy of
Cash Voucher
Redeemable
Owner
Made
chat_id
input
output
date/time
phone_number
GPT Chat
complaint_id
status
description
date/time
phone_number
Complaint
Gives
visit_id
mall_id
group_id
date/time
Used
Visit
Makes
Customer
Directed
Redeemable
isa
Visits
mall_id
mall_name
physical_address
mall_chain_id
chain_name
Mall
Management
>=1
Mall Chain
>=1
Tenancy
product_id
name
description
outlet_id
price
Product
Purchase
date/time
quantity
Offered
Outlet
outlet_name
unit_number
outlet_id
isa
Restaurant Complaint
on
isa
Shop Complaint
on
Shop
isa

SC2207 Lab 3: Generation of Normalised Database Schema

User (<u>phone_number</u>, date_of_birth, email, user_name, gender, home_address)
Keys: phone_number, email
Primary Key: phone_number
FDs:
phone_number → user_name, email, gender, date_of_birth, home_address
email → user_name, phone_number, gender, date_of_birth, home_address

The relation is not in 3NF.

<u>3NF Decomposition</u>

1. Minimal Basis
   phone_number → user_name
   phone_number → email
   phone_number → gender
   phone_number → date_of_birth
   phone_number → home_address
   email → phone_number
2. Combine FDs with same LHS
   a. phone_number → user_name, email, gender, date_of_birth, home_address
   b. email → phone_number
3. Create a table for each remaining FD
   a. **User_details(<u>phone_number</u>, user_name, email, gender, date_of_birth, home_address)**
   b. **User_email(<u>email</u>, phone_number)**

User_Details (<u>phone_number</u>, user_name, email, gender, date_of_birth, home_address)
Keys: phone_number
Primary Key: phone_number
FDs:
phone_number → user_name
phone_number → email
phone_number → gender
phone_number → date_of_birth
phone_number → home_address

The relation is in 3NF.

User_Email (<u>email</u>, phone_number)
Keys: email, phone_number
Primary Key: email
FDs:
email → phone_number
phone_number → email

The relation is in 3NF.

User_Relationship (<u>user1, user2</u>, relationship)
Keys: user1 + user2
Primary Key: user1 + user2
FDs:
user1 + user2 → relationship

This relation is in 3NF.

GPT_Chat (<u>chat_id</u>, input, output, date/time, phone_number)
Keys: chat_id
Primary Key: chat_id
FDs:
chat_id → input
chat_id → output
chat_id → date/time
chat_id → phone_number

This relation is in 3NF.

Recommendation (<u>recommendation_id</u>, start_date, start_time, end_date, end_time, phone_number, serial_id)
Keys: recommendation_id
Primary Key: recommendation_id
FDs:
recommendation_id → end_date,
recommendation_id → end_time
recommendation_id → start_date
recommendation_id → start_time
recommendation_id → phone_number
recommendation_id → serial_id (voucher)

This relation is in 3NF.

Mall_Recommendation (<u>recommendation_id</u>, mall_id, purchase_voucher_id)
Keys: recommendation_id
Primary Key: recommnedation_id
FDs:
recommendation_id → mall_id
recommendation_id → purchase_voucher_id

This relation is in 3NF.

Restaurant_Recommendation (recommendation_id, restaurant_id, cash_voucher_id)
Keys: recommendation_id
Primary Key: recommendation_id
FDs:
recommendation_id → restaurant_id
recommendation_id → cash_voucher_id

This relation is in 3NF.

Complaint (complain_id, status, description, date/time, phone_number, outlet_id)
Keys: complain_id
Primary Key: complain_id
FDs:
complain_id → status
complain_id → description
complain_id → date/time
complain_id → phone_number
complain_id → outlet_id

This relation is in 3NF.

Complaint_Shop (complain_id)
Keys: complain_id
Primary Key: complain_id
FDs:
complain_id → complain_id

This relation is in 3NF.

Complaint_Restaurant (complain_id)
Keys: complain_id
Primary Key: complain_id
FDs:
complain_id → complain_id

This relation is in 3NF.

Offered (product_id, outlet_id, price)
Keys: product_id + outlet_id
Primary Key: product_id + outlet_id
FDs:
product_id + outlet_id → price

This relation is in 3NF.

Product (product_id, name, description)
Keys: product_id
Primary Key: product_id
FDs:
Product_id → name
Product_id → description

This relation is in 3NF.

Purchase (visit_id, product_id, date/time, quantity)
Keys: visit_id + product_id
Primary Key: visit_id + product_id
FDs:
visit_id + product_id → date/time
visit_id + product_id → quantity

This relation is in 3NF.

Group_Name (group_id, group_name)
Keys: group_id
Primary Key: group_id
FDs:
group_id → group_name

This relation is in 3NF.

Group_Membership (group_id, phone_number)
Keys: group_id + phone_number
Primary Key: group_id + phone_number
FDs:
group_id + phone_number → group_id + phone_number

This relation is in 3NF.

Visit (visit_id, mall_id, group_id, date/time)
Keys: visit_id
Primary Key: visit_id
FDs:
visit_id → mall_id
visit_id → group_id
visit_id → date/time

This relation is in 3NF.

Mall (<u>mall_id</u>, mall_name, physical_address, mall_chain_id, chain_name)
Keys: mall_id, physical_address
Primary Key: mall_id
FDs:
mall_id → mall_name, physical_address, mall_chain_id
mall_chain_id → chain_name

This relation is not in 3NF.

<u>3NF Decomposition</u>

1. Minimal Basis
   mall_id → mall_name
   mall_id → physical_address
   mall_id → mall_chain_id
   mall_chain_id → chain_name
2. Combine FDs with same LHS
   a. mall_id → mall_name, physical_address, mall_chain_id
   b. mall_chain_id → chain_name
3. Create a table for each remaining FD
   a. **Mall (<u>mall_id</u>, mall_name, physical_address, mall_chain_id)**
   b. **Mall_Chain (<u>mall_chain_id</u>, chain_name)**

Mall (<u>mall_id</u>, mall_name, physical_address, mall_chain_id)
Keys: mall_id, physical_address
Primary Key: mall_id
FDs:
mall_id → mall_name
mall_id → physical_address
mall_id → mall_chain_id

This relation is in 3NF.

Mall_Chain (<u>mall_chain_id</u>, chain_name)
Keys: mall_chain_id
Primary Key: mall_chain_id
FDs:
mall_chain_id → chain_name

This relation is in 3NF.

Outlet (<u>outlet_id</u>, unit_number, outlet_name, mall_id)
Keys: outlet_id
Primary Key: outlet_id
FDs:
outlet_id → mall_id + unit_number
outlet_id → outlet_name

This relation is in 3NF.

Restaurant (<u>outlet_id</u>, franchise_id, franchise_name)
Keys: outlet_id, franchise_id
Primary Key: outlet_id
FDs:
outlet_id → franchise_id
franchise_id → franchise_name

This relation is not in 3NF.

<u>3NF Decomposition</u>

1. Minimal basis
   outlet_id → franchise_id
   franchise_id → franchise_name
2. Combine FDs with same LHS
   a. outlet_id → franchise_id
   b. franchise_id → franchise_name
3. Create a table for each remaining FD
   a. **Restaurant (<u>outlet_id</u>, franchise_id)**
   b. **Franchise (<u>franchise_id</u>, franchise_name)**

Restaurant (<u>outlet_id</u>, franchise_id)
Keys: outlet_id
Primary Key: outlet_id
FDs:
outlet_id → franchise_id

This relation is in 3NF.

Franchise (<u>franchise_id</u>, franchise_name)
Keys: franchise_id
Primary Key: franchise_id
FDs:
franchise_id → franchise_name

This relation is in 3NF.

Shop (<u>outlet_id</u>)
Keys: outlet_id
Primary Key: outlet_id
FDs:
outlet_id → outlet_id

This relation is in 3NF.

Tour_Instance (tour_id, date, time, package_id, bus_number, serial_id, group_id)
Keys: tour_id
Primary Key: tour_id
FDs:
tour_id → date
tour_id → time
tour_id → package_id
tour_id → bus_number
tour_id → serial_id
tour_id → group_id

This relation is in 3NF.

Day_Package (package_id, package_pax, mall_id, package_name, package_description)
Keys: package_id
Primary Key: package_id
FDs:
package_id → package_pax
package_id → mall_id
package_id → package_name
package_id → package_description

This relation is in 3NF.

Package_Visits (package_id, mall_id)
Keys: package_id + mall_id
Primary Key: package_id + mall_id
FDs:
package_id + mall_id → package_id + mall_id

This relation is in 3NF.

Voucher_Instance (serial_id, vouch_id, status, expiry_date)
Keys: serial_id
Primary Key: serial_id
FDs:
serial_id → vouch_id
serial_id → status
serial_id → expiry_date

This relation is in 3NF.

Cash_Voucher (vouch_id, outlet_id, terms, value)
Keys: vouch_id
Primary Key: vouch_id
FDs:
vouch_id → outlet_id
vouch_id → terms
vouch_id → value

This relation is in 3NF.

Purchase_Voucher (vouch_id, mall_id, terms, value)
Keys: vouch_id
Primary Key: vouch_id
FDs:
vouch_id → mall_id
vouch_id → terms
vouch_id → value

This relation is in 3NF.
