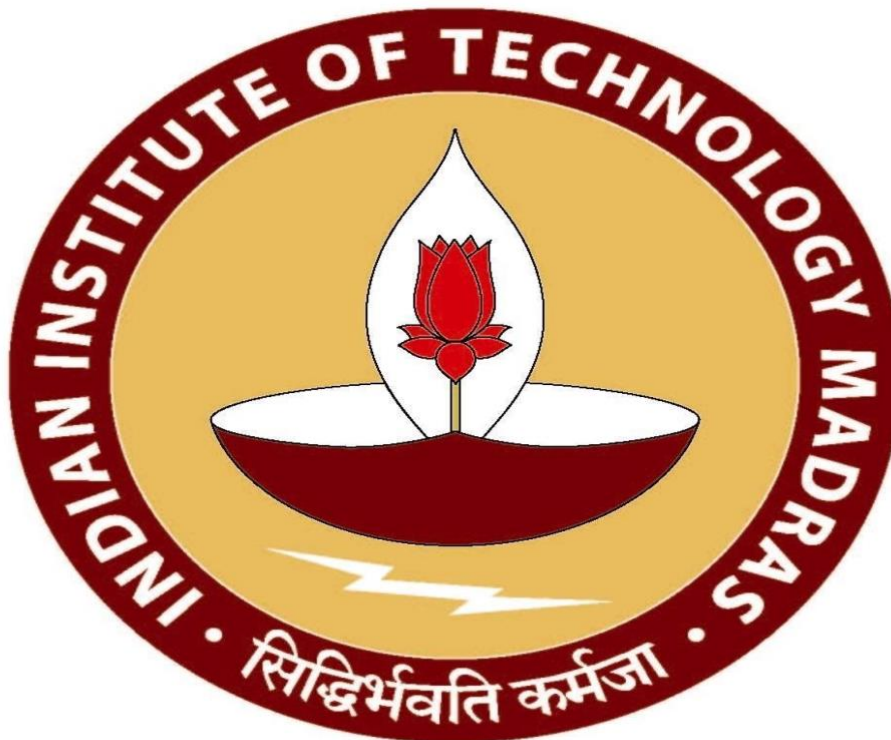


## **CS6852 : Assignment 1 - Ontology Design**



**Group – 05**

**Domain – Restaurant Management**

**Submitted To -**

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**Domain – Restaurant Management.**

**Design Choices and details –** We have identified all the major concepts that are relevant for our “Restaurant Ontology”.

The identified Concept names and their descriptions are as follows –

S.No	Concept Name	Concept Description
1.	Person	It is a primitive concept representing the person.
2.	Restaurant	It is a primitive concept representing a restaurant that prepares and serves food and drinks to customers.
3.	Food	It is a primitive concept representing real-world entity food.
4.	Beverage	It is a primitive concept representing anything that can be drunk.
5.	Amount	It is primitive concept representing amount money in rupees.
6.	Staff	Person who works at the restaurant.
7.	Expenditure	It is primitive concept representing cost of maintaining and running restaurant.
8.	Restaurateur	Person who owns a restaurant and pays for expenditure.
9.	Manager	Staff who manages a restaurant and staff of the restaurant.
10.	Supervisor	Staff who actively manages the restaurant staff.
11.	Cashier	Staff who generates bill and collects payment of the order from the customer.
12.	Chef	Staff who cooks food.
13.	Order	It contains food or beverages.
14.	Bill	It is prepared for exactly one order and contains exactly one Amount.
15.	MenuCard	It contains food or beverages planned by the Chef.

16.	Customer	Person who visits Restaurant, places order and pays for order.
17.	Waiter	Staff who takes orders and serves customer.
18.	BusyWaiter	Waiter which serves more than 5 customers.
19.	Janitor	Staff who maintains cleanliness at Restaurant.
20.	Dish	It contains different types of food
21.	Starter	It is a Dish which is served before MainCourse and is part of MenuCard.
22.	MainCourse	It is the main Dish and is part of MenuCard.
23.	Dessert	It is a Dish served at the end and is part of MenuCard.
24.	NonVegFood	It is a food containing meat and animal tissues.
25.	VegFood	It is a food that comes mostly from plants.
26.	ComboPack	It contains exactly one Starter, exactly one MainCourse and exactly one Dessert
27.	Table	It is a primitive concept representing a restaurant table used by customers to eat food.
28.	Valet	Staff who assists customers.
29.	ReservedTable	Table which is reserved by a customer.
30.	AvailableTable	Table which is available for reservation.
31.	Area	It is primitive type which represents different places in the restaurant.
32.	Kitchen	Area used by chef to cook food.
33.	BillingCounter	Area used by cashier to collect payments.
34.	RestRoom	Area used by any person to rest.
35.	PartyHall	Area used by and booked by the customer to throw the parties
36.	RawMaterial	Essentials needed to run a restaurant.

37.	Supplier	Person who supplies raw materials to run the restaurant.
38.	DiscountableOrder	It is order which contains more than 10 foods or beverages.
39.	Subscription	It is primitive concept which is purchased by the customer to avail special facilities from the restaurant.
40.	PrimeCustomer	Customer having atleast one subscription
41.	IndianDish	Dish which is originated from India
42.	ItalianDish	Dish which is originated from Italy
43.	MexiacanDish	Dish which is originated from Mexico
44.	ChineseDish	Dish which is originated from China
45.	StorageArea	Area used by staff and contains raw materials

## Role Names and Description –

1. worksAt –
  - (Staff,Restaurant) - Staff works at Restaurant.
2. owns -
  - (Restaurateur,Restaurant)-Restaurateur owns Restaurant
3. preparedFor –
  - (Bill,Order) - Bill prepared for Order
4. generates -
  - (Cashier,Bill) - Cashier generates Bill
5. generates -
  - (Cashier,Bill) - Cashier generates Bill
6. collectsPaymentFrom -
  - (Cashier,Customer) - Cashier collectsPaymentFrom Customer
7. manages -
  - (Manager,Restaurant) - Manager manages Restaurant
  - (Manager,Staff) - Manager manages staff
8. cooks –
  - (Chef,Food) - Chef cooks Food
9. managesActively –
  - (Supervisor,Staff) - Supervisor actively manages Staff.
10. plannedBy-
  - (MenuCard, Chef) - MenuCard is planned by the Chef.
11. visits -
  - (Customer, Restaurant) - Customer visits Restaurant.
12. places -
  - (Customer, Order) - Customer places Order.
13. paysFor -
  - (Customer, Order)- Customer pays for the Order he/she placed.
  - (Restaurateur, Expenditure) - Restaurateur pays for the Expenditure of the Restaurant.
  - (Customer, Subscription) - Customer pays for Subscription.
14. pays -
  - (Customer, Amount)- Customer pays Amount.
15. takes-

- (Waiter, Order) - Waiter takes Order from the Customer.
16. serves -
- (Waiter, Customer) - Waiter serves customer.-
17. maintainsCleanlinessAt-
- (Janitor, Restaurant) - Janitor maintainsCleanlinessAt Restaurant.
18. contains -
- (Dish,Food) - Dish contains Food.
  - (Order,Food) - Order contains Food.
  - (Bill,Amount) - Bill contains Amount.
  - (MenuCard, Food) - MenuCard contains Food.
  - (MenuCard, Beverage) - MenuCard contains Beverages.
  - (Order, Beverage) - Order contains Beverages.
  - (Order, Food)- Order contains Food.
  - (ComboPack,Starter) - ComboPack contains Starter.
  - (ComboPack,MainCourse) - ComboPack contains MainCourse.
  - (ComboPack,Dessert) - ComboPack contains Dessert.
  - (StorageArea,RawMaterial) - Storage Area contains RawMaterial.
19. partOf –
- (Starter, MenuCard) - Starter is a part of MenuCard.
  - (MainCourse,MenuCard) - MainCourse is a part of MenuCard.
  - (Dessert, MenuCard) - Dessert is a part of MenuCard.
20. assist –
- (Valet,Customer)- Valet assist Customer.
21. books -
- (Customer,Table) - Customer books Table
  - (Customer,PartyHall)- Customer books PartyHall
22. bookedBy-
- (Table,Customer) -Table is bookedBy Customer
  - (PartyHall,Customer)-PartyHall is bookedBy Customer
23. usedBy -
- (Kitchen, Chef) - Kitchen used by Chef.
  - (BillingCounter, Cashier) - BillingCounter used by Chef.
  - (PartyHall, Customer) - PartyHall is used by Customers.
  - (RestRoom, Person) - RestRoom is used by Person.
24. supplies –
- (Supplier, RawMaterial) - Suppliers supplies RawMaterial.
25. purchasedBy –
- (Subscription, Customer) - Subscription is purchasedBy Customer.

26. originatedFrom-

- (IndianDish, India) - IndianDish is originated from India.
- (MexicanDish, India) - MexicanDish is originated from Mexico.
- (ItalianDish, India) - ItalianDish is originated from Italy.
- (ChineseDish, India) - ChineseDish is originated from China.

## TBox -

1.  $\text{Staff} \equiv \text{Person} \sqcap \exists \text{worksAt}.\text{Restaurant}$
2.  $\text{Restaurateur} \equiv \text{Person} \sqcap \exists \text{owns}.\text{Restaurant} \sqcap \exists \text{paysFor}.\text{Expenditure}$
3.  $\text{Restaurateur} \sqsubseteq \neg \text{Staff}$
4.  $\text{Restaurant} \sqsubseteq \neg \text{Person}$
5.  $\text{Food} \sqcup \text{Beverage} \sqsubseteq \neg \text{Person}$
6.  $\text{Beverage} \sqsubseteq \neg \text{Food}$
7.  $\text{Manager} \equiv \text{Staff} \sqcap \exists \text{manages}.\text{Restaurant} \sqcap \exists \text{manages}.\text{Staff}$
8.  $\text{managesActively} \sqsubseteq \text{manages}$
9.  $\text{Supervisor} \equiv \text{Staff} \sqcap \forall \text{managesActively}.\text{Staff}$
10.  $\text{Area} \sqsubseteq \neg(\text{Person} \sqcup \text{Food} \sqcup \text{Beverage})$
11.  $\text{Chef} \equiv \text{Staff} \sqcap \forall \text{cooks}.\text{Food}$
12.  $\text{Kitchen} \sqsubseteq \text{Area} \sqcap \exists \text{usedBy}.\text{Chef}$
13.  $\text{Order} \sqsubseteq \exists \text{contains}.\text{Food} \sqcup \exists \text{contains}.\text{Beverage}$
14.  $\text{MenuCard} \equiv \exists \text{contains}.\text{Food} \sqcap \exists \text{contains}.\text{Beverage} \sqcap \exists \text{plannedBy}.\text{Chef}$
15.  $\exists \text{partOf}.\text{MenuCard} \sqsubseteq \text{Food} \sqcup \text{Beverage}$
16.  $\text{Customer} \equiv \text{Person} \sqcap \exists \text{visits}.\text{Restaurant} \sqcap \exists \text{places}.\text{Order} \sqcap \exists \text{paysFor}.\text{Order} \sqcap \exists \text{pays}.\text{Amount}$
17.  $\text{Bill} \equiv =1 \text{preparedFor}.\text{Order} \sqcap =1 \text{contains}.\text{Amount}$
18.  $\text{Cashier} \equiv \text{Staff} \sqcap \exists \text{generates}.\text{Bill} \sqcap \exists \text{collectsPaymentFrom}.\text{Customer}$
19.  $\text{Waiter} \equiv \text{Staff} \sqcap (\exists \text{takes}.\text{Order} \sqcup \exists \text{serves}.\text{Customer})$
20.  $\text{BusyWaiter} \equiv \text{Waiter} \sqcap \geq 5 \text{serves}.\text{Customer}$
21.  $\text{Janitor} \equiv \text{Staff} \sqcap \exists \text{maintainsCleanlinessAt}.\text{Restaurant}$
22.  $\text{Dish} \sqsubseteq \exists \text{contains}.\text{Food}$
23.  $\text{Starter} \sqsubseteq \text{Dish} \sqcap \forall \text{partOf}.\text{MenuCard}$
24.  $\text{MainCourse} \sqsubseteq \text{Dish} \sqcap \forall \text{partOf}.\text{MenuCard}$
25.  $\text{Dessert} \sqsubseteq \text{Dish} \sqcap \forall \text{partOf}.\text{MenuCard}$
26.  $\text{Starter} \sqsubseteq \neg \text{MainCourse}$
27.  $\text{Dessert} \sqsubseteq \neg \text{MainCourse}$
28.  $\text{Starter} \sqsubseteq \neg \text{Dessert}$
29.  $\text{VegFood} \sqsubseteq \text{Food}$
30.  $\text{NonVegFood} \sqsubseteq \text{Food}$
31.  $\text{NonVegFood} \equiv \neg \text{VegFood}$
32.  $\text{ComboPack} \equiv =1 \text{contains}.\text{Starter} \sqcap =1 \text{contains}.\text{MainCourse} \sqcap =1 \text{contains}.\text{Dessert}$
33.  $\text{Valet} \equiv \text{Staff} \sqcap (\exists \text{assists}.\text{Customer})$
34.  $\exists \text{books}.\text{Table} \sqsubseteq \text{Customer}$
35.  $\text{bookedBy} \equiv (\text{books})^{-1}$
36.  $\text{Table} \sqsubseteq \neg(\text{Person} \sqcup \text{Food} \sqcup \text{Beverage} \sqcup \text{Area})$
37.  $\text{ReservedTable} \equiv \text{Table} \sqcap \exists \text{bookedBy}.\text{Customer}$
38.  $\text{AvailableTable} \equiv \text{Table} \sqcap \neg \text{ReservedTable}$
39.  $\text{Kitchen} \sqsubseteq \text{Area} \sqcap \exists \text{usedBy}.\text{Chef}$
40.  $\text{BillingCounter} \sqsubseteq \text{Area} \sqcap \exists \text{usedBy}.\text{Cashier}$
41.  $\text{PartyHall} \sqsubseteq \text{Area} \sqcap \forall \text{usedBy}.\text{Customer} \sqcap \forall \text{bookedBy}.\text{Customer}$
42.  $\exists \text{books}.\text{PartyHall} \sqsubseteq \text{Customer}$
43.  $\text{RestRoom} \sqsubseteq \text{Area} \sqcap \exists \text{usedBy}.\text{Person}$
44.  $\text{Supplier} \equiv \text{Person} \sqcap \exists \text{supplies}.\text{RawMaterial}$
45.  $\text{StorageArea} \equiv \text{Area} \sqcap \exists \text{contains}.\text{RawMaterial} \sqcap \exists \text{usedBy}.\text{Staff}$
46.  $\text{DiscountableOrder} \equiv \text{Order} \sqcap \geq 10 \text{contains}.\text{(Food} \sqcup \text{Beverage)}$
47.  $\text{Subscription} \sqsubseteq \neg(\text{Person} \sqcup \text{Food} \sqcup \text{Beverage} \sqcup \text{Area} \sqcup \text{Table})$
48.  $\text{PrimeCustomer} \equiv \text{Customer} \sqcap \exists \text{paysFor}.\text{Subscription}$
49.  $\text{IndianDish} \equiv \text{Dish} \sqcap \exists \text{originatedFrom}.\{\text{India}\}$



- 50. MexicanDish  $\equiv$  Dish  $\sqcap \exists$ originatedFrom.{Mexico}
- 51. ChineseDish  $\equiv$  Dish  $\sqcap \exists$ originatedFrom.{China}
- 52. ItalianDish  $\equiv$  Dish  $\sqcap \exists$ originatedFrom.{Italy}

## **Situation/Example –**

1. Hotel Vijayalankar is a restaurant located in Chennai and Mr. Amit is the restaurateur of the hotel.
2. Idli, sambar, vada, etc forms food and tea, milk, soda, etc forms beverage.
3. Mr. Robert is the Chef of the restaurant who plans menu card containing food and beverages.
4. Rahul visits a restaurant, places an order, and pays for the order.
5. The placed order can become discountable if it contains greater than equal to 10 food or beverage items.
6. Samuel works at the restaurant as a waiter who takes orders and serves the customer.
7. Raveena works at a restaurant as a janitor and maintains cleanliness at the restaurant.
8. Mrs. Joey works at a restaurant as a cashier and generates a bill for a particular order and collects the payment from customers.
9. Rahul can book a table for dining or a party hall for celebrations.
10. Rahul can have a combo pack that includes one starter, one main course, and one dessert dish.
11. Rahul can become prime customer by paying for at least one subscription.
12. Vijayalankar offers different types of dishes consisting of Indian, Mexican, Chinese, etc.