



**NYU – TANDON SCHOOL OF ENGINEERING**  
**CS-GY 6083B, Fall 2023**  
**Principles of Database Systems**

**Assignment: 1 [100 points]**

Please submit your entire assignment in a single PDF to the Brightspace course site. Please state your Student ID, Name, Course, Section Number, and date of submission on the first page of your submission. Insert pictures of the ERD diagrams in the same PDF document. **All entities in your database designs should have your initial as a prefix, e.g., AP\_CUSTOMER.**






**Problem 1: 50 points**

**Business Case:**

The New York City Subway is a rapid transit system in the New York City boroughs of Manhattan, Brooklyn, Queens, and the Bronx. It is owned by the government of New York City and leased to the New York City Transit Authority, an affiliate agency of the state-run Metropolitan Transportation Authority (MTA). Opened on October 27, 1904, the New York City Subway is one of the world's oldest public transit systems, one of the most used, and the one with the most stations, with 472 stations in operation and 36 train lines.

SAMTA (Subway Administration of Metropolitan Transportation Authority ) is the NYU affiliated data analytics startup company. SAMTA has undertaken a database project to normalize subway data systems. Followings are the snippets of some of the dynamics of NYC subway services.

Primary Trunk line	Color	Service bullets
IND Eighth Avenue Line	Blue	A C E
IND Sixth Avenue Line	Orange	B D F F
IND Crosstown Line	Lime	G
BMT Canarsie Line	Light slate gray	L
BMT Nassau Street Line	Brown	J Z
BMT Broadway Line	Yellow	N Q R W
IRT Broadway–Seventh Avenue Line	Red	1 2 3
IRT Lexington Avenue Line	Green	4 5 6 6
IRT Flushing Line	Purple	7 7
IND Second Avenue Line	Turquoise	T
Shuttles	Dark slate gray	S

Station	Services	Div	Line	Opened	Borough	Neighborhood
First Avenue	L	BMT	 Canarsie Line	June 30, 1924	Manhattan	East Village
Second Avenue	F	IND	 Sixth Avenue Line	January 1, 1936	Manhattan	East Village
Third Avenue	L	BMT	 Canarsie Line	June 30, 1924	Manhattan	East Village
Third Avenue–138th Street	6	IRT	Pelham Line	August 1, 1918	The Bronx	Mott Haven
Third Avenue–149th Street	2 5	IRT	White Plains Road Line	July 10, 1905	The Bronx	Mott Haven
Fourth Avenue/Ninth Street	R	BMT	Fourth Avenue Line	June 22, 1915	Brooklyn	Park Slope
	F G	IND	Culver Line	October 7, 1933		
Fifth Avenue/53rd Street	E M	IND	Queens Boulevard Line	November 1, 1933	Manhattan	Midtown
Fifth Avenue–59th Street	N R W	BMT	 Broadway Line	September 1, 1919	Manhattan	Midtown
Seventh Avenue	B D E	IND	 Sixth Avenue Line, Queens Boulevard Line	August 19, 1933	Manhattan	Midtown

## **Business Requirements:**

**SAMTA** has provided the following details to develop a data model.

**For the train lines, SMATA intend to store data as follow:**

Train line (1,2,3,4,6,7... A,B, C. etc.)

Line name (Eight Avenue Line, Sixth Avenue Line, Broadway Line, Flushing Line, Brooklyn Line etc.)

Division (IND, BMT, IRT etc.)

Number of years the Line is in operation.

**For the subway stations , SMATA intend to store data as follow:**

Station Name (e.g., First Avenue, MetroTech, Madison Garden, Time Square, Central Park, Roosevelt Island etc.)

Station Address (e.g., 34 street and 7<sup>th</sup> Avenue, 42<sup>nd</sup> Street and 6<sup>th</sup> Avenue etc.)

Borough (Manhattan, Brooklyn, Bronx, Queens etc.)

Neighborhood ( East Village, Midtown, Downtown, Chinatown, SOHO, Chelsea etc.)

**For the subway stations facilities, SAMTA intend to store data as follow:**

Elevator, Escalator, Restroom, Wheelchair Accessible, Transfer Connection, Bus Connection, 24-hour booth etc.

[Facilities should be recorded as Y/N, and Number of each of such facilities (e.g., 2 Elevator, 3 Transfer connections etc.)

**For the subway operations, SAMTA intend to store data as follow:**

Train line, Subway station, arrival date and time, departure date and time, local/express/mixed.

For the starting station, arrival date and time should not be recorded.

For the final station, departure date and time should not be recorded.

**Resolve composite, derived, or multi-valued attributes, if any. Please use Oracle Data Modeler for creating E-R diagrams. Draw ERD (both Logical and Relational model) of this schema with appropriate primary keys, foreign keys, and relationships amongst them. If you have made valid assumptions other than those stated in the business case, please state them clearly in support of your ERD models.**

**Submit: 1) Logical Model 2) Relational Model 3) Any valid assumptions made 4) DDL code**

## **Problem 2: 50 points**

### **Business Case:**

Uber Eats is an online food ordering and delivery platform launched by Uber in 2014. Couriers deliver meals using cars, scooters, or bikes. It is operational in over 6,000 cities across 45 countries.

**UEAT (Uber Eat Analytics Team)** has hired you as an intern in Database Designer role. You have been assigned a database development project to create a data model. The business unit has provided the following details.

**For the Couriers (Delivery Person) UEAT intend to store following data:**

Name, Age, Home Address, Phone Number, Vehicle type (Car, Scooter, Bike etc.), Vehicle plate number (if applicable), Gender, Bank account number, Bank routing number

**For the customers UEAT intend to store following data:**

Name, Age, Home Address, Phone Number, Email address, Customer Type ( Corporate or Individual)

**For the restaurants UEAT intend to store following data:**

Name and address of the restaurant, phone number, website URL (if applicable), Specialty such as Indian Food, Mexican Food, Chinese Food, Italian Food, Fast Food, Oriental Food, American Food, Continental Food etc.

**For the delivery service UEAT intend to store following data:**

Date and Time of the order, Date and Time of the delivery, Oder amount, Payment Method(Credit/Debit card), Tips, Card Number, Name on the card, expiration date, CVV number. At present UEAT does not support payment method as CASH or Digital Wallet.

**Please identify entities, their appropriate attributes, characteristics of attributes, relationships amongst entities, and resolve many to many relationships, if any. Resolve any composite, derived, or multi-valued attributes, if any. Please use Oracle Data Modeler for creating E-R diagrams. Draw ERD (both Logical and Relational model) of this schema with appropriate primary keys, foreign keys, and relationships amongst them. If you have made valid assumptions other than those stated in the business case, please state them clearly in support of your ERD models.**

**Submit: 1) Logical Model 2) Relational Model 3) Any valid assumptions made (other than stated business rules), 4 DDL code**