‘Pfizer’ DB Analysis

Title: Team GALS, Pfizer Analytics, Date: 12/5/2022

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Agenda

1. Background
2. ERD and Relational Schema
3. Queries

Background

- Our company’s client is Pfizer that takes care of supply of medicines and vaccines globally and is one of the renowned pharmaceutical company

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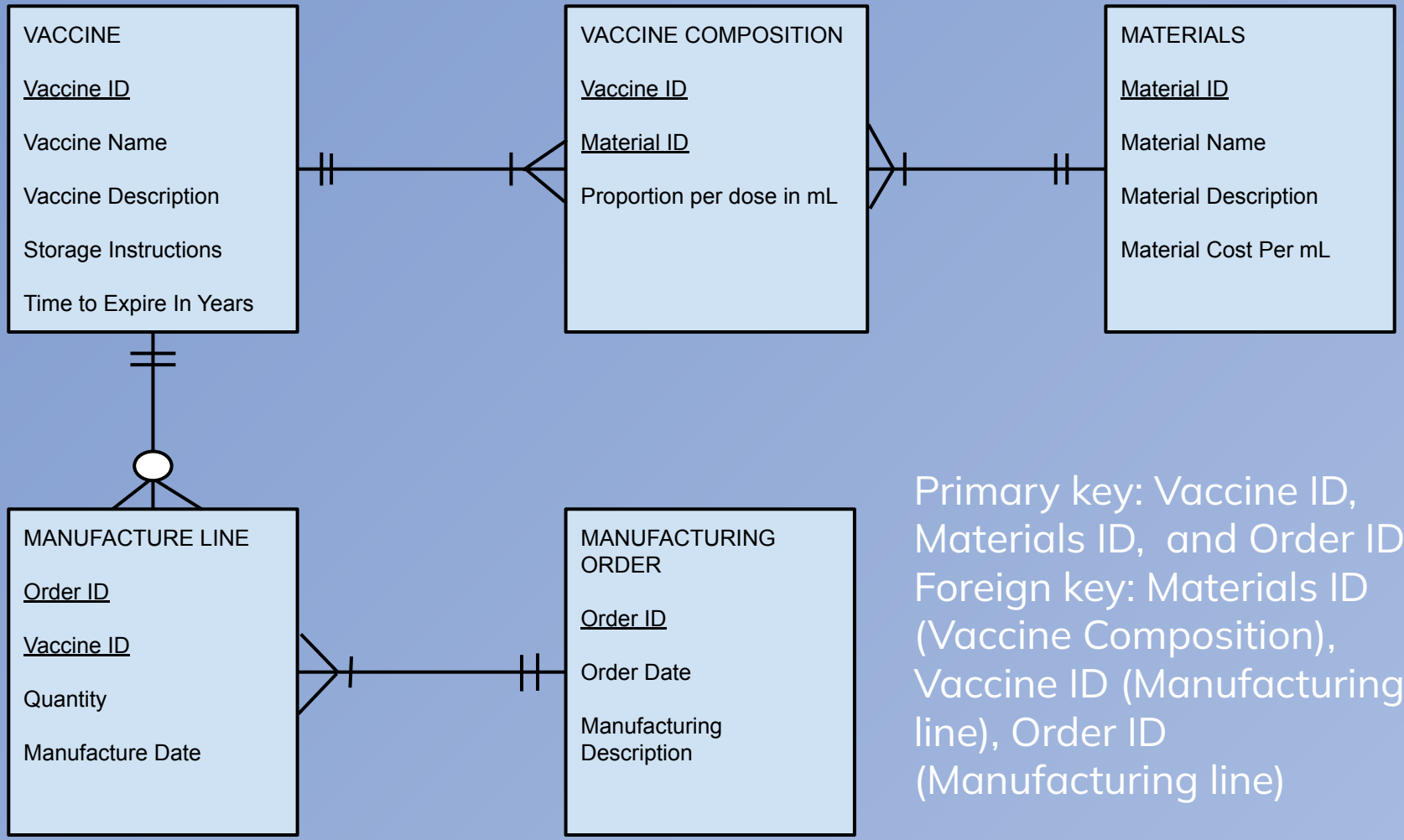
Mission Statement

- Our main goal revolved around deriving significant insights from Pfizer’s database and how they can use these for improving their business.
- The objective is to create a useful and healthy database to build business insights related to ‘Pfizer's’ manufacturing

ERD Diagram

- The ERD consists of 5 entities namely Vaccine, vaccine composition, materials, Manufacturing line and manufacturing order.



Primary key: Vaccine ID, Materials ID, and Order ID
Foreign key: Materials ID (Vaccine Composition), Vaccine ID (Manufacturing line), Order ID (Manufacturing line)

Understanding our Relational Schema

- The relational schema has 5 entities

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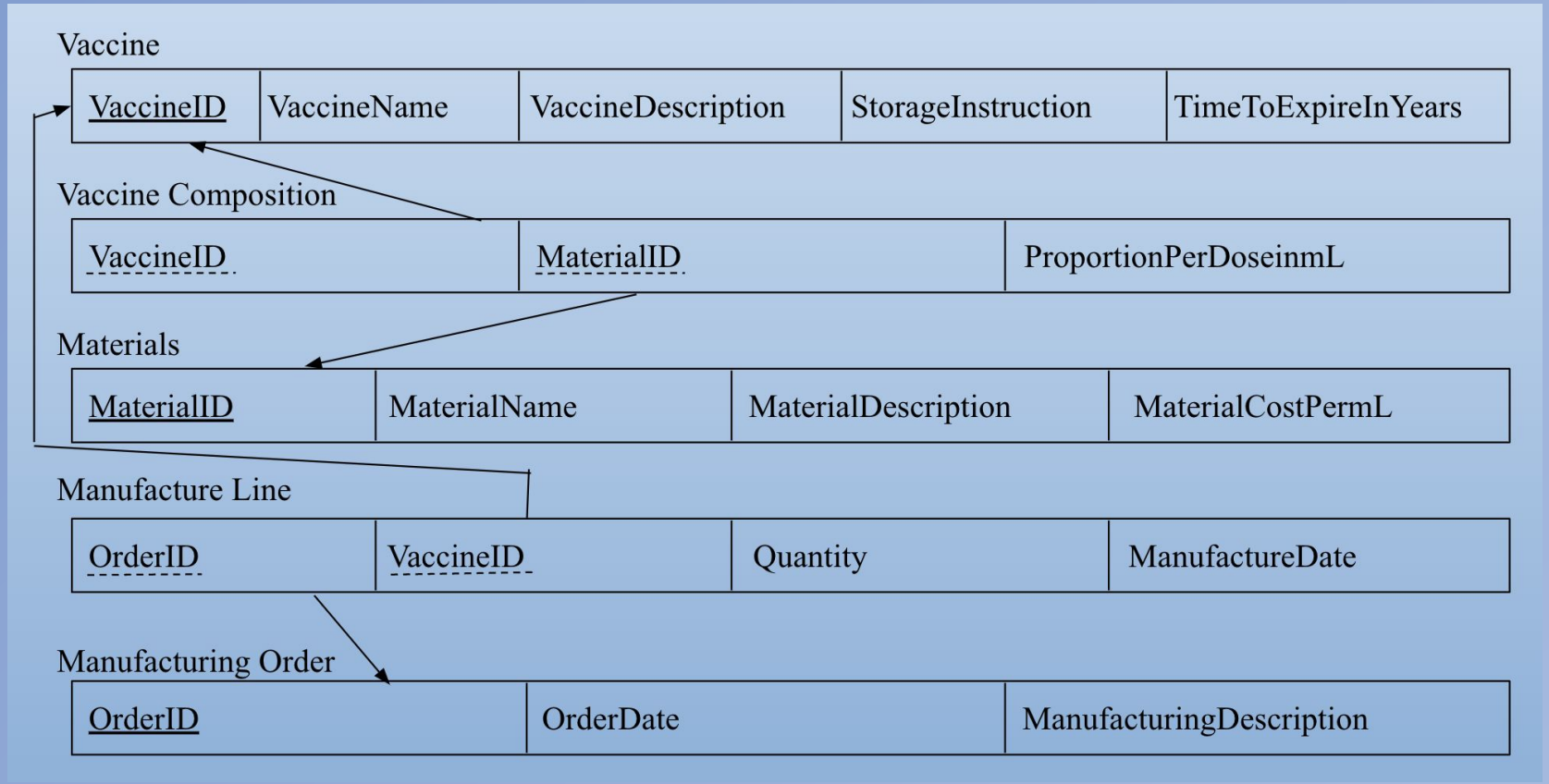
Vaccine
VaccineID
VaccineName
VaccineDescription
StorageInstruction
TimeToExpireInYears
Vaccine Composition
VaccineID
MaterialID
ProportionPerDoseinmL
Materials
MaterialID
MaterialName
MaterialDescription
MaterialCostPermL
Manufacture Line
OrderID
VaccineID
Quantity
ManufactureDate
Manufacturing Order
OrderID
OrderDate
ManufacturingDescription

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Database Implementation

- SQL CREATE TABLE with Primary and Foreign Key

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VACCINES

```
CREATE TABLE `VACCINES` (

  `VaccineID` varchar(12) NOT NULL,
  `VaccineName` text,
  `VaccineDescription` text,
  `StorageInstructions` text,
  `TimeToExpireInYears` int(11)
DEFAULT NULL,

  PRIMARY KEY (`VaccineID`)
);
```

```
INSERT INTO `mgospoda`.`VACCINES`

(`VaccineID`,
`VaccineName`,
`VaccineDescription`,
`StorageInstructions`,
`TimeToExpireInYears`)

VALUES
(<{VaccineID: }>,
<{VaccineName: }>,
<{VaccineDescription: }>,
<{StorageInstructions: }>,
<{TimeToExpireInYears: }>);
```

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MATERIALS

```
CREATE TABLE `MATERIALS` (

  `MaterialID` varchar(10) NOT NULL,
  `MaterialName` text,
  `MaterialDescription` text,
  `MaterialCostPermL` double DEFAULT
NULL,

  PRIMARY KEY (`MaterialID`)
);
```

```
INSERT INTO `mgospoda`.`MATERIALS`

(`MaterialID`,
`MaterialName`,
`MaterialDescription`,
`MaterialCostPermL`)

VALUES

(<{MaterialID: }>,
<{MaterialName: }>,
<{MaterialDescription: }>,
<{MaterialCostPermL: }>);
```

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VACCINE COMPOSITION

```
CREATE TABLE `VACCINECOMPOSITION` (
  `VaccineID` varchar(12) NOT NULL,
  `MaterialID` varchar(12) NOT NULL,
  `PorportionPerDoseinmL` double DEFAULT
NULL,
  KEY `MaterialIDFK_idx` (`MaterialID`),
  KEY `VaccineIDFK_idx` (`VaccineID`),

  CONSTRAINT `VaccineIDFK` FOREIGN KEY
(`VaccineID`) REFERENCES `VACCINES`
(`VaccineID`) ON DELETE NO ACTION ON
UPDATE NO ACTION,

  CONSTRAINT `MaterialIDFK` FOREIGN KEY
(`MaterialID`) REFERENCES `MATERIALS`
(`MaterialID`) ON DELETE NO ACTION ON
UPDATE NO ACTION
);
```

```
INSERT INTO
`mgospoda`.`VACCINECOMPOSITION`
(`VaccineID`,
`MaterialID`,
`PorportionPerDoseinmL`)

VALUES
(<{VaccineID: }>,
<{MaterialID: }>,
<{PorportionPerDoseinmL: }>);
```

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MANUFACTURING ORDER

```
CREATE TABLE
`MANUFACTURINGORDER` (

  `OrderID` int(11) NOT NULL,
  `OrderDate` datetime DEFAULT NULL,

  `ManufacturingDescription` text,

  PRIMARY KEY (`OrderID`)
);
```

```
INSERT INTO
`mgospoda`.`MANUFACTURINGORDER`
(`OrderID`,
`OrderDate`,
`ManufacturingDescription`)

VALUES

(<{OrderID: }>,
<{OrderDate: }>,
<{ManufacturingDescription: }>);
```

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MANUFACTURE LINE

CREATE STATEMENT:

```
CREATE TABLE `MANUFACTURELINE` (
  `OrderID` int(11) NOT NULL,
  `VaccineID` varchar(12) NOT NULL,
  `Quantity` int(11) DEFAULT NULL,
  `ManufactureDate` datetime DEFAULT NULL,

  KEY `OrderIDFK` (`OrderID`),
  KEY `VaccineIDFK` (`VaccineID`),

CONSTRAINT `OrderIDFK` FOREIGN KEY (`OrderID`)
REFERENCES `MANUFACTURINGORDER` (`OrderID`)
ON DELETE NO ACTION ON UPDATE NO ACTION,

CONSTRAINT `VaccineIDFK` FOREIGN KEY
(`VaccineID`) REFERENCES `VACCINES` (`VaccineID`)
ON DELETE NO ACTION ON UPDATE NO ACTION
);
```

INSERT STATEMENT:

```
INSERT INTO `mgospoda`.`MANUFACTURELINE`
(`OrderID`,
`VaccineID`,
`Quantity`,
`ManufactureDate`)

VALUES
(<{OrderID: }>,
<{VaccineID: }>,
<{Quantity: }>,
<{ManufactureDate: }>);
```

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Queries With SQL

1. The following query will show the storage instruction for the vaccine called “Prevenar13”

```
SELECT StorageInstructions
FROM VACCINES

WHERE  VaccineName =
‘Prevenar13’;
```

VaccineName	StorageInstructions
Prevenar13	Refrigerated between 2Â°C and 8Â°C (36Â°F a...

2. The following query will show the vaccine with the highest ordered quantity

```
SELECT VaccineName,
    MAX(Quantity) as Quantity
FROM VACCINES V,
    MANUFACTURELINE ML

WHERE V.VaccineID =
ML.VaccineID;
```

VaccineName	Quantity
Human Papillomavirus	22000000

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3. The following query will show the proportion per dose for material “JE”

```
SELECT VaccineID,
    PorportionPerDoseinmL
FROM VACCINECOMPOSITION

WHERE VaccineID = 'JE';
```

VaccineID	PorportionPerDoseinmL
JE	0.4

4. The following query will show the expiration time for the vaccine with the shortest amount of shelf life

```
SELECT VaccineName,
    MIN(TimeToExpireInYears) as
    ShortestTimetoExpire
FROM VACCINES;
```

VaccineName	ShortestTimetoExpire
Human Papillomavirus	1

5. The following query will show all vaccine with order quantity greater than 500,000

METHOD 1: INNER JOIN

```
SELECT VaccineName, Quantity
FROM VACCINES AS A

INNER JOIN MANUFACTURELINE AS B
    ON A.VaccineID = B.VaccineID

WHERE Quantity > 500000
GROUP BY VaccineName
ORDER BY Quantity DESC;
```

VaccineName	Quantity
Hepatitis A	22000000
M-M-R II	1000000
Human Papillomavirus	740000
Hepatitis B	670000
Polio	670000
Hib	660000
Influenza	590000
Prevenar 13	540000
DTaP	540000
Herpes Zoster	510000

METHOD 2: SUBQUERY

```
SELECT VaccineName, A.Quantity
FROM VACCINES, (
        SELECT VaccineID, Quantity
        FROM MANUFACTURELINE
        WHERE Quantity > 500000
        GROUP BY VaccineID) AS A

WHERE VACCINES.VaccineID = A.VaccineID
ORDER BY A.Quantity DESC;
```

6. The following query will show the top 3 most ordered vaccines

```
SELECT VaccineName, SUM(Quantity)
FROM VACCINES, MANUFACTURELINE

WHERE VACCINES.VaccineID =
   MANUFACTURELINE.VaccineID

GROUP BY VaccineName
ORDER BY SUM(Quantity) DESC LIMIT
3;
```

VaccineName	SUM(Quantity)
Hepatitis A	23650000
M-M-R II	2330000
DTaP	1670000

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7. The following query will show the material cost for each vaccine

```
SELECT VaccineName,
    SUM(MaterialCostPermL) AS 'Material Cost
    Per Dose'
FROM MATERIALS, VACCINECOMPOSITION,
    VACCINES

WHERE MATERIALS.MaterialID =
    VACCINECOMPOSITION.MaterialID
AND VACCINECOMPOSITION.VaccineID =
    VACCINES.VaccineID

GROUP BY VaccineName;
```

VaccineName	Material Cost Per Dose
Antrax	0.98
DTaP	1.24
Hepatitis A	2.01
Hepatitis B	0.7
Herpes Zoster	0.82
Hib	0.82
Human Papillomavirus	0.33
Influenza	0.98
Japanese Encephalitis	0.54
M-M-R II	1.52
Meningococcal	0.82
Nimenrix	1.02
Pneumococcal	0.33
Polio	0.54
Prevenar 13	3.36
YF-Vax	1.7400000000000002

8. The following query will show the manufacturing description, order date and average quantity for each vaccine

```
SELECT ManufacturingDescription,
    OrderDate,
    (SELECT AVG(Quantity) FROM
    MANUFACTURELINE WHERE
    VaccineID = B.VaccineID) AvgQuantity

FROM MANUFACTURINGORDER AS A

LEFT OUTER JOIN MANUFACTURELINE
    AS B
ON A.OrderID = B.OrderID
ORDER BY OrderDate;
```

ManufacturingDescription	OrderDate	AvgQuantity
Package in halves to ship separately	2020-06-19 00:00:00	450000.0000
Package in halves to ship separately	2020-08-17 00:00:00	540000.0000
Deliver to same address as last order	2020-10-22 00:00:00	4730000.0000
N/A	2020-11-02 00:00:00	388333.3333
N/A	2020-12-09 00:00:00	388333.3333
Package in halves to ship separately	2021-02-28 00:00:00	345000.0000
Deliver to same address as last order	2021-06-21 00:00:00	450000.0000
Early order	2021-06-22 00:00:00	110000.0000
N/A	2021-08-14 00:00:00	670000.0000
Deliver between 2 locations	2021-11-07 00:00:00	376666.6667
For pickup	2021-11-08 00:00:00	376666.6667
For pickup	2021-11-28 00:00:00	388333.3333
N/A	2022-01-14 00:00:00	515000.0000
For pickup	2022-01-15 00:00:00	415000.0000
N/A	2022-05-01 00:00:00	450000.0000
For pickup	2022-05-23 00:00:00	240000.0000
Special delivery instructions: get 2 si...	2022-07-25 00:00:00	590000.0000
Early order	2022-07-30 00:00:00	490000.0000
Requested delivery in 2 months	2022-08-21 00:00:00	4730000.0000
Requested delivery in 2 months	2022-09-27 00:00:00	275000.0000

9. The following query will show all vaccine names with a proportion dose of 0.1

```
SELECT VaccineName,
   PorportionPerDoseinmL
FROM VACCINES,
   VACCINECOMPOSITION

WHERE VACCINES.VaccineID IN
   (SELECT VaccineID FROM
   VACCINECOMPOSITION WHERE
   PorportionPerDoseinmL = 0.1)

AND VACCINES.VaccineID =
   VACCINECOMPOSITION.VaccineID
ORDER BY VaccineName;
```

VaccineName	PorportionPerDoseinmL
Herpes Zoster	0.1

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10. The following query will show all vaccines ordered in the second quarter of 2020

```
SELECT VACCINES.VaccineName,
   A.OrderDate

FROM VACCINES,
   MANUFACTURELINE,
   (SELECT *
   FROM MANUFACTURINGORDER
   WHERE OrderDate >'2020-04-01'
   AND OrderDate < '2020-07-01') as A

WHERE VACCINES.VaccineID =
   MANUFACTURELINE.VaccineID
AND MANUFACTURELINE.OrderID =
   A.OrderID;
```

VaccineName	OrderDate
Hib	2020-06-19 00:00:00

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Thank You!