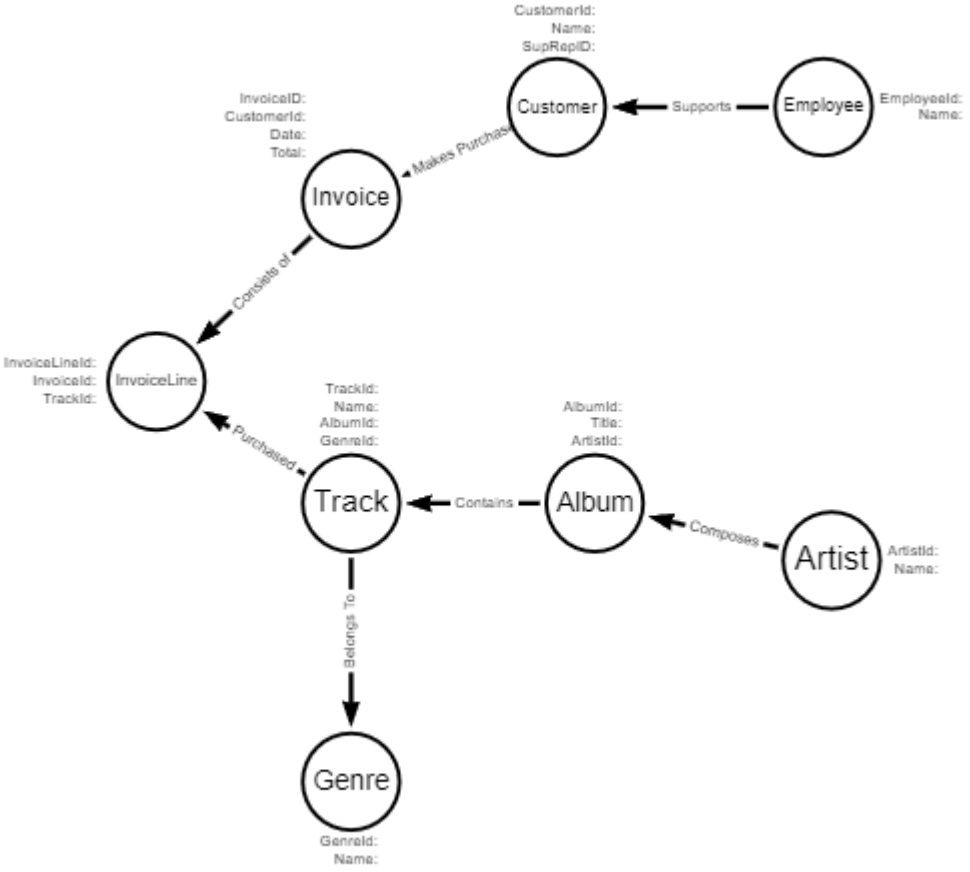
PART 1:

1. ***What is the meaning of relationship between Customer and Employee?***
    a. Each employee is related to 1 or many customers. Each customer has a supportRepId field which assigns them to a particular employee, assumedly for purposes of customer support.

2. ***What is the meaning of relationships between Employee and Employee?***
    a. Employees report to other employees (Managers, for example). The employee-employee relationship represents the internal hierarchy structure of the business

3. ***Can an album be recorded by multiple artists?***
    a. Under the given data model - No. Each artist can have many albums, but each album can only have 1 artist related to it.
4. ***How many genres can a track belong to?***
    a.
5. ***Are all Playlists shared among all customers or are they customer-specific?***
    a. They are shared among customers - because there is no direct relationship between customer and playlist, only between track and playlist.
6. ***Does the model support business cases when discounts are applied to customer purchases?***
    a. *Yes, the InvoiceLine has a unique id associated with unit price so in theory discount could be applied to individual invoices associated to a particular customer purchase.*
7. ***What are the calculated fields in this data model?***
    a. ***Track****: UnitPrice -* ***InvoiceLine****: UnitPrice, Quantity -* ***Invoice****: Total*
8. ***Is it possible to understand the quality of audio tracks (bitrate) from this data? How?***
    a. *Yes, by performing the following conversion: (Bytes / MS) * 8000 -- Using the Bytes and Milliseconds properties of 'Track'*

PART 2:



PART 3:

```
CALL{
   MATCH (p)
   RETURN labels(p) AS type, count(p) as cnt
   UNION
   MATCH ()-[r]->()
   RETURN type(r) as type, count(r) as cnt
} return type, cnt
ORDER BY cnt DESC
```

Returns:

type	cnt
"CONSISTS_OF"	13440
["Invoice"]	4532

["Track"]	3503
"CONTAINS"	3503
"BELONGS_TO"	3503
"CONTRIBUTED_TO"	2525
[]	2525
"MAKES_PURCHASE"	2472
"PURCHASED"	2240
["InvoiceLine"]	2240
["Composer"]	1649
["Album"]	347
"COMPOSES"	347
["Artist"]	275
["Customer"]	59
"SUPPORTS"	59
["Genre"]	25
["Employee"]	8
"REPORTS_TO"	7

```
CALL db.schema.nodeTypeProperties()
```

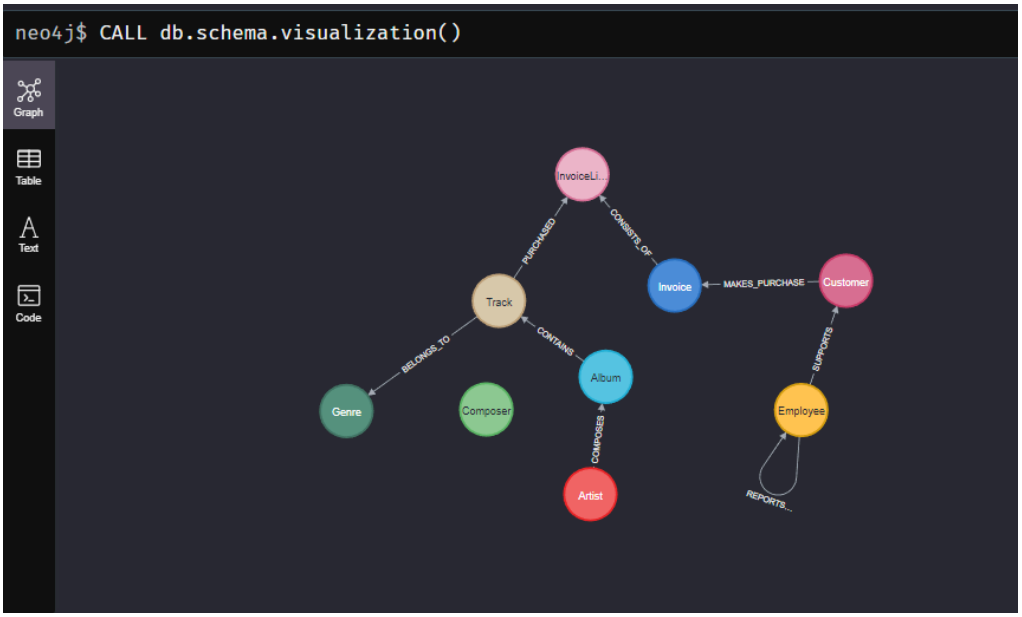
nodeType	nodeLabels	propertyName	propertyTypes	mandatory
":`Artist`"	["Artist"]	"ArtistId"	["String"]	true
":`Artist`"	["Artist"]	"Name"	["String"]	true
":`Track`"	["Track"]	"AlbumId"	["String"]	true
":`Track`"	["Track"]	"Name"	["String"]	true
":`Track`"	["Track"]	"Composer"	["String"]	false
":`Track`"	["Track"]	"Bytes"	["String"]	true
":`Track`"	["Track"]	"UnitPrice"	["String"]	true

":`Track`"	["Track"]	"MediaTypeId"	["String"]	true
":`Track`"	["Track"]	"GenreId"	["String"]	true
":`Track`"	["Track"]	"Milliseconds"	["String"]	true
":`Track`"	["Track"]	"TrackId"	["String"]	true
""	[]	null	null	false
":`Genre`"	["Genre"]	"Name"	["String"]	true
":`Genre`"	["Genre"]	"GenreId"	["String"]	true
":`Composer`"	["Composer"]	"Name"	["String"]	true
":`InvoiceLine`"	["InvoiceLine"]	"InvoiceId"	["String"]	true
":`InvoiceLine`"	["InvoiceLine"]	"InvoiceLineId"	["String"]	true
":`Invoice`"	["Invoice"]	"InvoiceId"	["Long", "String"]	true
":`Invoice`"	["Invoice"]	"BillingCountry"	["String"]	true
":`Invoice`"	["Invoice"]	"BillingCity"	["String"]	true
":`Invoice`"	["Invoice"]	"Total"	["String", "Double"]	true
":`Invoice`"	["Invoice"]	"CustomerId"	["Long", "String"]	true
":`Invoice`"	["Invoice"]	"InvoiceDate"	["Long", "Date", "DateTime"]	true
":`Invoice`"	["Invoice"]	"BillingState"	["String"]	false
":`Customer`"	["Customer"]	"CustomerId"	["String"]	true
":`Customer`"	["Customer"]	"LastName"	["String"]	true
":`Customer`"	["Customer"]	"City"	["String"]	true
":`Customer`"	["Customer"]	"FirstName"	["String"]	true
":`Customer`"	["Customer"]	"State"	["String"]	false
":`Customer`"	["Customer"]	"Country"	["String"]	true
":`Customer`"	["Customer"]	"SupportRepId"	["String"]	true
":`Employee`"	["Employee"]	"Title"	["String"]	true
":`Employee`"	["Employee"]	"EmployeeId"	["String"]	true
":`Employee`"	["Employee"]	"LastName"	["String"]	true
":`Employee`"	["Employee"]	"City"	["String"]	true
":`Employee`"	["Employee"]	"FirstName"	["String"]	true
":`Employee`"	["Employee"]	"HireDate"	["Date"]	true
":`Employee`"	["Employee"]	"Country"	["String"]	true
":`Employee`"	["Employee"]	"State"	["String"]	true
":`Employee`"	["Employee"]	"ReportsTo"	["String"]	false
":`Employee`"	["Employee"]	"BirthDate"	["Date"]	true
":`Album`"	["Album"]	"AlbumId"	["String"]	true

":`Album`"	["Album"]	"Title"	["String"]	true
":`Album`"	["Album"]	"ArtistId"	["String"]	true

```
CALL db.schema.relTypeProperties()
```

relType	propertyName	propertyTypes	mandatory
":`COMPOSES`"	null	null	false
":`CONTAINS`"	null	null	false
":`BELONGS_TO`"	null	null	false
":`CONTRIBUTED_TO`"	null	null	false
":`PURCHASED`"	null	null	false
":`CONSISTS_OF`"	null	null	false
":`MAKES_PURCHASE`"	null	null	false
":`SUPPORTS`"	null	null	false
":`REPORTS_TO`"	null	null	false



PART 4:

1. ***Are there customers whose musical preferences are well defined?***

a. Customers who have a purchase history of the same genres or artists would have well defined music preferences.

2. ***Who spent most of the money on tracks? Give me top 5 names and their amount spent***

```
1 MATCH (c:Customer)-[:MAKES_PURCHASE]→(i:Invoice)
2 RETURN c.FirstName + ' ' + c.LastName AS CustomerName,
  sum(toFloat(i.Total)) AS TotalPurchases
3 ORDER BY TotalPurchases DESC
4 LIMIT 5
5
```

Table | Text | Code

CustomerName	TotalPurchases
"Helena Holý"	297.72
"Richard Cunningham"	285.7199999999999
"Luis Rojas"	279.71999999999997
"Hugh O'Reilly"	273.72000000000014
"Ladislav Kovács"	273.71999999999997

MAX COLUMN WIDTH:

3. ***What genres are most popular?***
    a. Top genres are: Rock, Latin, Metal, Alternative & Punk
4. ***Do you think we can learn anything about Employees' preferences for music? One way to find out would be to check if there exist meaningful associations between employees and musical genres. Employees are likely to suggest music which they like themselves to their customers. We can look at this in class, but you can retrieve the data and try to make sense of it.***
    a. I think we could do this but would need some more relationships in the sense that we would need to know an employees personal purchase history, or some other way to figure out their personal preferences.
5. ***Come up with interesting questions about this business and try answering them using your knowledge of Cypher and the database you have created.***
    a. My question: Where are the majority of customers located? This could be used to analyse patterns between customers based on location. Here is the query for it:

```
1 MATCH (c:Customer)
2 RETURN c.Country AS Country, count(*) AS CountryCount
3 ORDER BY CountryCount DESC
4
```

And result:

Country	CountryCount
"USA"	13
"Canada"	8
"Brazil"	5
"France"	5
"Germany"	4
"United Kingdom"	3
"Czech Republic"	2
"Portugal"	2
"India"	2
"Norway"	1