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## Sample – Redis

### Database

The database used for this assignment revolves around 5 popular sitcoms in TV history and contains several aspects of each sitcom which are: year released, number of seasons, number of episodes, number of awards. It also includes the main actors in each sitcom along with their date of birth (DOB) and the character each actor played in the sitcom.

The database consists of 2 Hashes with 28 and 5 entries in each respectively, 2 lists for the actors and sitcoms to identify their IDs in the hashes, and 5 sorted sets for the year released, number of seasons, number of episodes, and number of awards.

### Queries

Before starting with the queries, the order of the lists should be investigated to successfully complete the queries, the first list for the sitcoms can be explored using the following query along with the result in figure 2:

*Lrange Sitcoms 0 10*

```
127.0.0.1:6379> lrange Sitcoms 0 10
1) "How-I-Met-Your-Mother"
2) "Seinfeld"
3) "Modern-Family"
4) "The-Big-Bang-Theory"
5) "The-Office"
```

*Figure 1 Sitcoms List*

As for the actors list, it can be explored using the following query along with the result shown in figure 3:

*Lrange Actors 0 -1*

```
127.0.0.1:6379> Lrange Actors 0 -1
1) "Jerry-Seinfeld"
2) "Julia-Louis-Dreyfus"
3) "Michael-Richards"
4) "Jason-Alexander"
5) "Josh-Radnor"
6) "Jason-Segel"
7) "Cobie-Smulders"
8) "Neil-Patrick-Harris"
9) "Alyson-Hannigan"
10) "Steve-Carell"
11) "Jenna-Fischer"
12) "John-Krasinski"
13) "Rainn-Wilson"
14) "Jim-Parsons"
15) "Johnny-Galecki"
16) "Kaley-Cuoco"
17) "Simon-Helberg"
18) "Kunal-Nayyar"
19) "Ed-ONeill"
20) "Sofia-Vergara"
21) "Julie-Bowen"
22) "Ty-Burrell"
23) "Jesse-Tyler-Ferguson"
24) "Eric-Stonestreet"
25) "Rico-Rodriguez"
26) "Sarah-Hyland"
27) "Nolan-Gould"
28) "Ariel-Winter_"
```

*Figure 2 Actors List*

#### 1. Getting all the sitcoms and their rating

This query provides insights on the highest rated sitcoms throughout history.

*zrange Rating 0 10 withscores*

```
127.0.0.1:6379> zrange Rating 0 10 withscores
1) "The-Big-Bang-Theory"
2) "8.0999999999999996"
3) "How-I-Met-Your-Mother"
4) "8.3000000000000007"
5) "Modern-Family"
6) "8.4000000000000004"
7) "Seinfeld"
8) "8.8000000000000007"
9) "The-Office"
10) "8.9000000000000004"
```

*Figure 3 Sitcoms by rating*

As shown in figure 4, the query shows that “The Office” is the most popular sitcom rated at 8.9 on IMDB, with the least popular one being “The Big Bang Theory” which is rated 8.1.

## 2. Sitcoms with more than 200 episodes

This query provides insights on which sitcoms continued for more than 200 episodes.

*zrangebyscore Episodes 200 +inf withscores*

```
127.0.0.1:6379> zrangebyscore Episodes 200 +inf withscores
1) "How-I-Met-Your-Mother"
2) "208"
3) "Modern-Family"
4) "250"
5) "The-Big-Bang-Theory"
6) "280"
```

*Figure 4 Sitcoms with more than 200 episodes*

As shown in figure 5, the query shows that only 3 of the sitcoms filmed more than 200 episodes, where “The Big Bang Theory” had the highest number of episodes with 280 episodes.

## 3. Sitcoms released before the year 2000

This query shows which sitcom released its first season before the year 2000.

*zrangebyscore Year 0 2000 withscores*

```
127.0.0.1:6379> zrangebyscore Year 0 2000 withscores
1) "Seinfeld"
2) "1989"
```

*Figure 5 Sitcoms released before 2000*

The query in figure 6 shows that only “Seinfeld” was released before the year 2000 started as the first season was released in 1989.

## 4. Sitcoms that won more than 70 awards

This query explores which sitcoms won more than 70 awards throughout its production.

*zrangebyscore Awards 70 +inf withscores*

```
127.0.0.1:6379> zrangebyscore Awards 70 +inf withscores
1) "Seinfeld"
2) "74"
3) "The-Big-Bang-Theory"
4) "77"
5) "Modern-Family"
6) "119"
```

*Figure 6 Sitcoms with more than 70 awards*

Figure 7 above shows that 3 sitcoms won more than 70 awards, “Modern Family” claimed the highest number of awards with 119 awards.

#### 5. All the details of the actor Neil Patrick Harris

This query shows all the details of the actor Neil Patrick Harris, the actor’s id was taken from the actors list query that is provided in figure 3 above.

*hgetall Actor:8*

```
1) "Name"
2) "Neil-Patrick-Harris"
3) "DOB"
4) "15-06-1973"
5) "Sitcom"
6) "How-I-Met-Your-Mother"
7) "Sitcom.Char"
8) "Barney-Stinson"
```

*Figure 7 Neil Patrick Harris details*

As shown in figure 8, the actor who played “Barney Stinson” in “How I Met Your Mother” was born on the 15<sup>th</sup> of June in 1973.

#### 6. What character did Jim Parsons play and in what sitcom

This query also relies on the actors list shown in figure 3, it explores the character that actor Jim Parsons played. As shown in figure 9 below:

*hmget Actor:13 Sitcom.Char Sitcom*

```
127.0.0.1:6379> hmget Actor:14 Sitcom.Char Sitcom
1) "Sheldon-Cooper"
2) "The-Big-Bang-Theory"
```

*Figure 8 Jim Parsons character*

The result shows that actor Jim Parsons played “Sheldon Cooper” in “The Big Bang Theory”.

#### 7. How many awards were won by “How I Met Your Mother”

This query shows the number of awards won by the sitcom “How I Met Your Mother”, with the sitcom id being taken from the sitcoms list shown in figure 2 above.

*Hmget Sitcom:1 Title Awards*

```
127.0.0.1:6379> hget Sitcom:1 Awards
"26"
127.0.0.1:6379> hmget Sitcom:1 Title Awards
1) "How-I-Met-Your-Mother"
2) "26"
--- -- - ---- -
```

*Figure 9 How I Met Your Mother Awards*

The result shown in figure 10 above shows that the hit sitcom only won 26 awards. Figure 9 shows 2 queries being applied where one only shows the number of awards and the other one showing the title of the series as well, which is better used for confirmation.

#### 8. The release date of the first season of the sitcom “The Office”.

This query also uses the sitcoms list in figure 2, it shows in what year was the highest rated sitcom released.

*hmget Sitcom:5 Title Year*

```
127.0.0.1:6379> hmget Sitcom:5 Title Year
1) "The-Office"
2) "2005"
```

*Figure 10 The Office release year*

The result in figure 11 shows that the first season of “The Office” was released in the year 2005.

#### 9. The number of episodes in specific sitcoms

This query explores the number of episodes in each “Seinfeld” and “The Office”, where the sitcoms IDs were taken from figure 2 above.

*zrange Episodes 0 1 withscores*

```
127.0.0.1:6379> zrange Episodes 0 1 withscores
1) "Seinfeld"
2) "172"
3) "The-Office"
4) "188"
```

*Figure 11 Number of Episodes in The Office and in Seinfeld*

As shown in figure 12, “Seinfeld” released 172 episodes while “The Office” released 188 episodes.

#### 10. All the details of the sitcom “Seinfeld”

This query shows all the details of the sitcom “Seinfeld”, which is the only sitcom released before the year 2000 and is also the second highest rated sitcom in the database. The sitcom ID was taken from figure 2 above.

*hgetall Sitcom:2*

```
127.0.0.1:6379> hgetall Sitcom:2
1) "Title"
2) "Seinfeld"
3) "Year"
4) "1989"
5) "Seasons"
6) "9"
7) "Episodes"
8) "172"
9) "Awards"
10) "74"
```

*Figure 12 Seinfeld details*

The result in figure 13 shows that the sitcom “Seinfeld” which has 9 seasons and 172 episodes, has won 74 awards since it was first released in 1989.

## Sample – Cassandra

### Database

The database for this part focuses on the best-selling albums and artists in the music industry, the database contains 2 tables, one for the best-selling albums and the other is for the best-selling artists. Each table contains of several different columns and contains various data types as well.

The albums table consists of an integer ID column as the primary key, a string album name, a string artist name, a string genre showing the genre of the album, a Boolean band to show whether the artist is a band or an individual, a set of members to be used if the Boolean was set to true, an integer release year, a float for the total sales in millions, a float UK\_sales, and a float US\_Sales. The table was created using the following code:

```
create table Albums( ID int primary key, Album varchar, Artist varchar, Genre varchar, Band boolean, Members set<text>, Year int, Sales float, UK_Sales float, US_Sales float);
```

The Artists table consisted of an integer ID column as the primary key, a string artist name, a string country of origin, an integer career start year, a string genre, a Boolean active column that shows whether the artist is still active or not, a Boolean band for the same purpose as in the albums table, a set of members for the same purpose as well, and a float total record sales in millions. The code below was used to create the table:

```
create table Artists( ID int primary key, Artist varchar, Country varchar, Start_Year int, Genre varchar, Active boolean, Band boolean, Members set<text>, Sales float);
```

## Queries

### 1. Best-selling albums with over 25 million sales

This query aims to show the highest selling albums throughout history, the assessment is done by querying albums that recorder more the 25 million official record sales. The result of the query is shown in figure 14 below.

```
select album, artist, sales where sales > 25 allow filtering;
```

```
cqlsh:cwdb> select album, artist, sales from albums where sales > 25 allow filtering;
```

album	artist	sales
The Eminem Show	Eminem	27
Thriller	Michael Jackson	49.2
Hotel California	Eagles	31.5
Back in Black	AC/DC	29.5
21	Adele	26.4
Hybrid Theory	Linkin Park	27
Come On Over	Shania Twain	29.6

Figure 13 Albums with over 25 million record sales

The result shows that only 7 albums recorded more than 25 million record sales throughout history, with Michael Jackson's Thriller album claiming the highest sales with 49.2 million record sales.

### 2. Best-selling inactive artists

This query aims to show the best-selling artists that no longer record sales and no longer perform in the industry, as shown in figure 15 below.

```
select artist, sales from artists where active = false allow filtering;
```

```
cqlsh:cwdb> select artist, sales from artists where active= false allow filtering;
```

artist	sales
Led Zeppelin	142.2
Michael Jackson	247.60001
Elvis Presley	229.39999
The Beatles	288.70001
Pink Floyd	123.1

Figure 14 Best-selling inactive artists

The result shows that 5 artists from the top selling artists are inactive, these sales are cemented and are no longer varying in history, the highest selling inactive artist is the band "The Beatles".

### 3. Best-selling Hip-Hop albums

This query aims to show the best-selling albums in a specific genre which is Hip-Hop.

*select album, artist, sales from albums where genre = 'Hip Hop' allow filtering;*

`cqlsh:cwdb> select album,artist, sales from albums where genre = 'Hip Hop' allow filtering;`

album	artist	sales
The Eminem Show	Eminem	27
All Eyez On Me	2Pac	9
Recovery	Eminem	5.8
Tha Carter III	Lil Wayne	6.5
The Marshall Mathers LP	Eminem	21

Figure 15 Best-selling Hip-Hop albums

The result shown in figure 16 shows that only Eminem has reached double digits in terms of album record sales in the Hip-Hop genre and has done so in 2 different occasions with “The Eminem Show” claiming the highest number of record sales in the Hip-Hop genre with 27 million record sales.

### 4. Best-selling albums in the US with over 19 million record sales within the US

This query explores the best-selling album in the US only, with the threshold of 19 million record sales being the criteria. The result is shown in figure 17.

*select album, artist, uk\_sales from albums where us\_sales > 19 allow filtering;*

`cqlsh:cwdb> select album, artist, us_sales from albums where us_sales > 19 allow filtering;`

album	artist	us_sales
Thriller	Michael Jackson	34
Hotel California	Eagles	26
Back in Black	AC/DC	25
Come On Over	Shania Twain	20

Figure 16 Albums with over 19 million US sales

The result shows the 4 albums that have the highest record sales in the US, the top spot belongs to Michael Jackson’s Thriller as it did in the world sales query previously.

### 5. Best-selling artists from the UK

This query aims to show the best-selling artists that originated from the UK.

*select artist, country, sales from artists where country = 'United Kingdom' allow filtering;*

`cqlsh:cwdb> select artist, country, sales from artists where country = 'United Kingdom' allow filtering ;`

artist	country	sales
Led Zeppelin	United Kingdom	142.2
Queen	United Kingdom	168.89999
The Rolling Stones	United Kingdom	102
Coldplay	United Kingdom	103.6
Ed Sheeran	United Kingdom	232.5
The Beatles	United Kingdom	288.70001
Elton John	United Kingdom	203.3
Adele	United Kingdom	128
Pink Floyd	United Kingdom	123.1

Figure 17 Best-selling artists from the UK



As shown in figure 18, there are several best-sellers that originated from the UK, the highest selling UK artist are “The Beatles”, who also claim the best-selling inactive artist record.

#### 6. Best-selling artists the debuted after the year 1995

This query provides insight on which artists started their career after 1995 and made an impact in the all-time best-selling artists list.

*select artist, sales, start\_year from artists where start\_year > 1995 allow filtering;*

```
cqlsh:cwdb> select artist,sales, start_year from artists where start_year > 1995 allow filtering;
```

artist	sales	start_year
Drake	391.20001	2001
Lil Wayne	164	1996
Taylor Swift	235.60001	2006
Rihanna	321.70001	2005
Eminem	247.60001	1996
Linkin Park	92.5	1996
Coldplay	103.6	1996
Ed Sheeran	232.5	2004
Adele	128	2006

Figure 18 Best-selling artists that debuted after 1995

As shown in figure 19 above, there are several artists that debuted after 1995, with the most recent debut being in 2006 when both Adele and Taylor Swift started their perspective careers.

#### 7. Best-selling hip-hop albums in the UK, with over 1 million record sales within the UK

This query shows which Hip-Hop albums made over 1 million record sales in the UK.

*select album, artist, uk\_sales from albums where genre='Hip Hop' and uk\_sales >= 1 allow filtering;*

```
cqlsh:cwdb> select album,artist, uk_sales from albums where genre = 'Hip Hop' and uk_sales >= 1 allow filtering;
```

album	artist	uk_sales
The Eminem Show	Eminem	1.8
Recovery	Eminem	1
The Marshall Mathers LP	Eminem	2.5

Figure 19 Hip-Hop albums with over 1 million record sales in the UK

The result shown in figure 20 above shows that only Eminem was able to achieve more than 1 million record sales in the UK, and he did it on 3 different occasions, with “The Marshall Mathers LP” claiming 2.5 million record sales in the UK only.

#### 8. Best-selling pop albums that were released after the year 2000

This query shows the best-selling pop albums released after 2000, the result is shown in figure 21 below.

*select album, artist, uk\_sales from albums where genre='Hip Hop' and uk\_sales >= 1 allow filtering;*

```
cqlsh:cwdb> select album, artist, year from albums where genre='Pop' and year > 2000 allow filtering;
```

album	artist	year
25	Adele	2015
21	Adele	2011

Figure 20 Best-selling pop albums after 2000

The result shows that Adele was the most successful artist by having 2 best-selling albums that were released in 2011 and 2015 respectively.

### 9. How many millions did Linkin Park sell

This query shows how many millions in record sales did “Linkin Park” sell and who are the members of the band. As shown in figure 22.

*select artist, members, sales from artists where artist = 'Linkin Park' allow filtering;*

```
cqlsh:cwdb> select artist, members, sales from artists where artist = 'Linkin Park' allow filtering;
```

artist	members	sales
Linkin Park	{'Brad Delson', 'Chester Bennington', 'Dave Farrell', 'Joe Hahn', 'Mike Shinoda', 'Rob Bourdon'}	92.5

Figure 21 Linkin Park total sales

The result shows the members of the band “Linkin Park”, which sold 92.5 million record sales worldwide.

### 10. How many albums does Michael Jackson have and showing the total sales of these albums

This query explores number of best-selling albums that Michael Jackson released, and how many million record sales did both albums make.

*select artist, count(album) as number\_of\_albums, sum(sales) as total\_sales from albums where artist = 'Michael Jackson' allow filtering;*

```
cqlsh:cwdb> select artist, count(album) as Number_of_Albums, sum(sales) as total_sales from albums where artist = 'Michael Jackson' allow filtering;
```

artist	number_of_albums	total_sales
Michael Jackson	2	70.3

Figure 22 Total sales of Michael Jackson's best-selling albums

The result shown in figure 23 shows that Michael Jackson had 2 albums in the best-selling albums list, returning 70.3 million record sales for the king of pop.

## Sample – MongoDB

### Database

The database used for this assignment is a product catalog for some of the popular PlayStation 5 (PS5) games. The data contains several data types and has 29 documents in the collection, the collection created is called “Playstation\_Store”, and in a separate “CW” database in the system.

### Queries

#### 1. All games available for the PS4 console

This query aims to show all the PS5 games that are available for the PS4 console and PS4 players.

```
db.Playstation_Store.find({'Available for PS4':true}).pretty()
```

```

> db.Playstation_Store.find({'Available for PS4':true}).pretty()
{
  "_id" : 2,
  "Title" : "Fortnite",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Epic Games",
  "Price" : 0,
  "Released" : ISODate("2020-11-12T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 12,
  "PS Plus required for online play" : false
}
{
  "_id" : 7,
  "Title" : "Elden Ring",
  "Genre" : [
    "Role Playing"
  ],
  "Developer" : "Bandai Namco",
  "Price" : 49.99,
  "Released" : ISODate("2022-02-25T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 16,
  "PS Plus required for online play" : true
}
{
  "_id" : 8,
  "Title" : "Cyberpunk 2077",
  "Genre" : [
    "Role Playing"
  ],
  "Developer" : "CD Projekt",
  "Price" : 39.99,
  "Released" : ISODate("2022-02-15T00:00:00Z"),

```

*Figure 23 All games available for PS4*

The result shown in figure 24 above shows all the games that are available for both consoles. Such as “Elden Ring” which supports both consoles.

## 2. All free games in the store

This query aims to show all the free games that are available in the store. The result is shown in figure 25.

```
db.Playstation_Store.find({'Price':0}).pretty()
```

```

> db.Playstation_Store.find({'Price':0}).pretty()
{
  "_id" : 2,
  "Title" : "Fortnite",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Epic Games",
  "Price" : 0,
  "Released" : ISODate("2020-11-12T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 12,
  "PS Plus required for online play" : false
}
{
  "_id" : 12,
  "Title" : "eFootball 2022",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "Konami",
  "Price" : 0,
  "Released" : ISODate("2021-09-29T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 3,
  "PS Plus required for online play" : false
}
{
  "_id" : 22,
  "Title" : "CRSED",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Gaijin Distribution"
}

```

*Figure 24 All free games*

The result shows several free games available such as Fortnite, which is available for both consoles.

## 3. Games that don't require a “PS Plus” subscription for online play

Some PlayStation games require a special “PS Plus” subscription to allow players to engage in online gaming, this query shows the games that don't require the subscription in order to play online.

```
db.Playstation_Store.find({'PS Plus required for online play':false}).pretty()
```

```
> db.Playstation_Store.find({'PS Plus required for online play':false}).pretty()
{
  "id" : 2,
  "Title" : "Fortnite",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Epic Games",
  "Price" : 0,
  "Released" : ISODate("2020-11-12T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 12,
  "PS Plus required for online play" : false
}
{
  "id" : 4,
  "Title" : "Ratchet & Clank: Rift Apart",
  "Genre" : [
    "Action"
  ],
  "Developer" : "Sony",
  "Price" : 69.99,
  "Released" : ISODate("2021-06-10T23:00:00Z"),
  "Available for PS4" : false,
  "PEGI" : 7,
  "PS Plus required for online play" : false
}
{
  "id" : 5,
  "Title" : "Ghostwire: Tokyo",
  "Genre" : [
    "Action",
    "Adventure"
  ],
  "Developer" : "Bethesda",
  "Price" : 59.99,
  "Released" : ISODate("2022-07-28T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 18,
  "PS Plus required for online play" : false
}
```

Figure 25 Games that don't require PS Plus

Figure 26 shows more than one game, such as “Ratchet & Clank: Rift Apart” which is developed by “Sony” and does not require any additional subscriptions for online play.

#### 4. Games suitable for 15-year-old players.

All games are rated by a special “PEGI” system that rates the suitable age for any game, this query shows all games that are rated “PEGI 15” or less, which means they are suitable for 15-year-old players.

```
db.Playstation_Store.find({'PEGI':{'$lte:15}}).pretty()
```

```
> db.Playstation_Store.find({'PEGI':{$lte:15}}).pretty()
{
  "id" : 2,
  "Title" : "Fortnite",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Epic Games",
  "Price" : 0,
  "Released" : ISODate("2020-11-12T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 12,
  "PS Plus required for online play" : false
}
{
  "id" : 4,
  "Title" : "Ratchet & Clank: Rift Apart",
  "Genre" : [
    "Action"
  ],
  "Developer" : "Sony",
  "Price" : 69.99,
  "Released" : ISODate("2021-06-10T23:00:00Z"),
  "Available for PS4" : false,
  "PEGI" : 7,
  "PS Plus required for online play" : false
}
{
  "id" : 5,
  "Title" : "Ghostwire: Tokyo",
  "Genre" : [
    "Action",
    "Adventure"
  ],
  "Developer" : "Bethesda",
  "Price" : 59.99,
  "Released" : ISODate("2022-03-25T00:00:00Z")
}
```

Figure 26 Games suitable for 15-year-olds

The figure 27 shows the result of the query, which shows several games rated “PEGI 15” and below, such as Fortnite which is rated “PEGI 12”.

## 5. Games identified as Sport games

This query shows all the games that are considered sport games, the result is shown in figure 28.

`db.Playstation_Store.find({'Genre':'Sport'}).pretty()`

```
> db.Playstation_Store.find({'Genre':'Sport'}).pretty()
{
  "id" : 10,
  "Title" : "WWE 2K22",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "2K",
  "Price" : 64.99,
  "Released" : ISODate("2022-03-11T00:00:00Z"),
  "Available for PS4" : false,
  "PEGI" : 16,
  "PS Plus required for online play" : true
}
{
  "id" : 12,
  "Title" : "eFootball 2022",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "Konami",
  "Price" : 0,
  "Released" : ISODate("2021-09-29T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 3,
  "PS Plus required for online play" : false
}
{
  "id" : 14,
  "Title" : "Fifa 22",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "EA",
  "Price" : 24.49,
  "Released" : ISODate("2021-09-30T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 3,
}
```

Figure 27 Sport Games

The query shows several games that have the “Sport” genre, such as “FIFA 22”, which costs £24.49.

## 6. Games developed by “EA”

This query aims to show all the games that are released by the developer EA.

`db.Playstation_Store.find({'Developer':'EA'}).pretty()`

```
> db.Playstation_Store.find({'Developer':'EA'}).pretty()
{
  "_id" : 11,
  "Title" : "Star Wars Jedi: Fallen Order",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "EA",
  "Price" : 8.99,
  "Released" : ISODate("2021-06-10T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 16,
  "PS Plus required for online play" : false
}
{
  "_id" : 14,
  "Title" : "Fifa 22",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "EA",
  "Price" : 24.49,
  "Released" : ISODate("2021-09-30T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 3,
  "PS Plus required for online play" : true
}
{
  "_id" : 16,
  "Title" : "Madden NFL 22",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "EA",
  "Price" : 20.99,
  "Released" : ISODate("2021-08-19T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 3,
  "PS Plus required for online play" : true
}
```

Figure 28 Games developed by EA

As shown in figure 29, there are several games developed by EA, such as “FIFA 22” which is a sport game.

#### 7. Games released in the year 2022

This query shows the most recently released games, more specifically, released in the year 2022.

`db.Playstation_Store.find({'Released':{'$gt:new Date("2021-12-31")'}}).pretty()`

```
> db.Playstation_Store.find({'Released':{'$gt:new Date("2021-12-31")'}}).pretty()
{
  "_id" : 5,
  "Title" : "Ghostwire: Tokyo",
  "Genre" : [
    "Action",
    "Adventure"
  ],
  "Developer" : "Bethesda",
  "Price" : 59.99,
  "Released" : ISODate("2022-03-25T00:00:00Z"),
  "Available for PS4" : false,
  "PEGI" : 12,
  "PS Plus required for online play" : false
}
{
  "_id" : 7,
  "Title" : "Elden Ring",
  "Genre" : [
    "Role Playing"
  ],
  "Developer" : "Bandai Namco",
  "Price" : 49.99,
  "Released" : ISODate("2022-02-25T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 16,
  "PS Plus required for online play" : true
}
{
  "_id" : 8,
  "Title" : "Cyberpunk 2077",
  "Genre" : [
    "Role Playing"
  ],
  "Developer" : "CD Projekt",
  "Price" : 39.99,
  "Released" : ISODate("2022-02-15T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 16,
  "PS Plus required for online play" : true
}
```

Figure 29 Games released in 2022

Figure 30 shows that several games were released in 2022, such as “Elden Ring” which was released on the 25<sup>th</sup> of February 2022.

#### 8. Games that cost less than £25, sorted from the highest to the lowest.

This query shows all the games that cost less than £25 sorted from highest price to lowest.

`db.Playstation_Store.find({'Price':{'$lt:25}}).sort({'Price':1}).pretty()`

```
> db.Playstation_Store.find({'Price':{$lt:25}}).sort({'Price':-1}).pretty()
{
  "id" : 1,
  "Title" : "Ghostrunner",
  "Genre" : [
    "Action"
  ],
  "Developer" : "505 Games",
  "Price" : 24.99,
  "Released" : ISODate("2021-09-27T23:00:00Z"),
  "Available for PS4" : false,
  "PEGI" : 18,
  "PS Plus required for online play" : true
}
{
  "id" : 14,
  "Title" : "Fifa 22",
  "Genre" : [
    "Sport"
  ],
  "Developer" : "EA",
  "Price" : 24.49,
  "Released" : ISODate("2021-09-30T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 3,
  "PS Plus required for online play" : true
}
{
  "id" : 15,
  "Title" : "Assasin's Creed Valhalla",
  "Genre" : [
    "Role Playing"
  ],
  "Developer" : "Ubisoft",
  "Price" : 23.99,
  "Released" : ISODate("2020-11-12T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 18,
  "PS Plus required for online play" : false
}
```

Figure 30 Games for less than £25

The result in figure 31 shows that several games are under £25, with “Ghostrunner” being the most expensive one in the list at £24.99.

#### 9. Games in the “Unique” genre that are suitable for 17-year-old players.

This query explores all games that are in the “Unique” genre and are suitable for 17-year-olds in the “PEGI” rating system.

```
db.Playstation_Store.find({'$and':{'Genre':'Unique'},{'PEGI':{$lte:17}}}).pretty()
```

```
> db.Playstation_Store.find({'$and':{'Genre':'Unique'},{'PEGI':{$lte:17}}}).pretty()
{
  "id" : 2,
  "Title" : "Fortnite",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Epic Games",
  "Price" : 0,
  "Released" : ISODate("2020-11-12T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 12,
  "PS Plus required for online play" : false
}
{
  "id" : 11,
  "Title" : "Star Wars Jedi: Fallen Order",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "EA",
  "Price" : 8.99,
  "Released" : ISODate("2021-06-10T23:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 16,
  "PS Plus required for online play" : false
}
{
  "id" : 20,
  "Title" : "No Man's Sky",
  "Genre" : [
    "Action",
    "Adventure",
    "Unique"
  ],
  "Developer" : "Hello Games",
  "Price" : 29.99,
  "Released" : ISODate("2020-08-23T00:00:00Z"),
  "Available for PS4" : true,
  "PEGI" : 16,
  "PS Plus required for online play" : false
}
```

Figure 31 Unique games suitable for 17-year-olds

The result in figure 32 shows that several games fall in the category specified, such as “Star Wars Jedi: Fallen Order” which is an “Action, Adventure, and Unique” game that has a “PEGI 16” rating.

#### 10. How many games were released with the PS5 release on the 12<sup>th</sup> of November in 2020.

This query aims to show the number of games that were released with the initial release of the PS5 console on the 12<sup>th</sup> of November in 2020.

```
db.Playstation_Store.aggregate ( [{ $match: {'Released':new Date("2020-11-12") }},
{ $count: " Number_of_Games " } ] )
```

```
> db.Playstation_Store.aggregate([{$match: {'Released': new Date("2020-11-12")}}, {$count: "Number_of_Games"}])
{ "Number_of_Games" : 7 }
```

Figure 32 Number of games released with the PS5

As shown in figure 33, there are 7 games in the store that were released with the PS5 release.

- [MongoDB Compass](#)

It is important to mention that MongoDB compass' analysis tool provides additional insights on the data in the collection. For example, figure 34 below shows an interactive visualization that shows the percentage of games developed by a specific developer to all the games in the catalog/store.

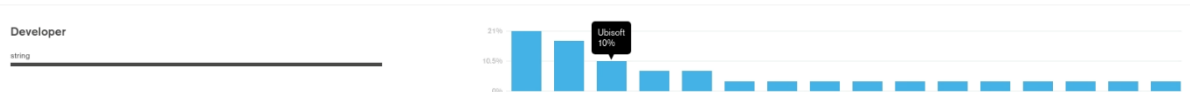


Figure 33 MongoDB Compass Tool

## Sample – Neo4J

### Database

The database for this assignment revolves around Marvel movies, the database contains a total of 65 nodes distributed over 3 labels which as follows:

11. Actor: Name, Avenger, and Character name.
12. Director: Name.
13. Movie: Chronological order, Title, Year released, and IMDB rating.

The relationships created between the nodes consists of “Appeared\_in” and “Directed” which points at which actor appeared in a certain movie and which director directed said movie.

### Queries

1. All the movies where the avenger “Iron Man” featured in.

This query aims to show all the movies that the avenger “Iron Man” appeared in.

Match (A:Actor)-[R:Appeared\_in]->(M:Movies) where A.Avenger = 'Iron Man' return A,R,M



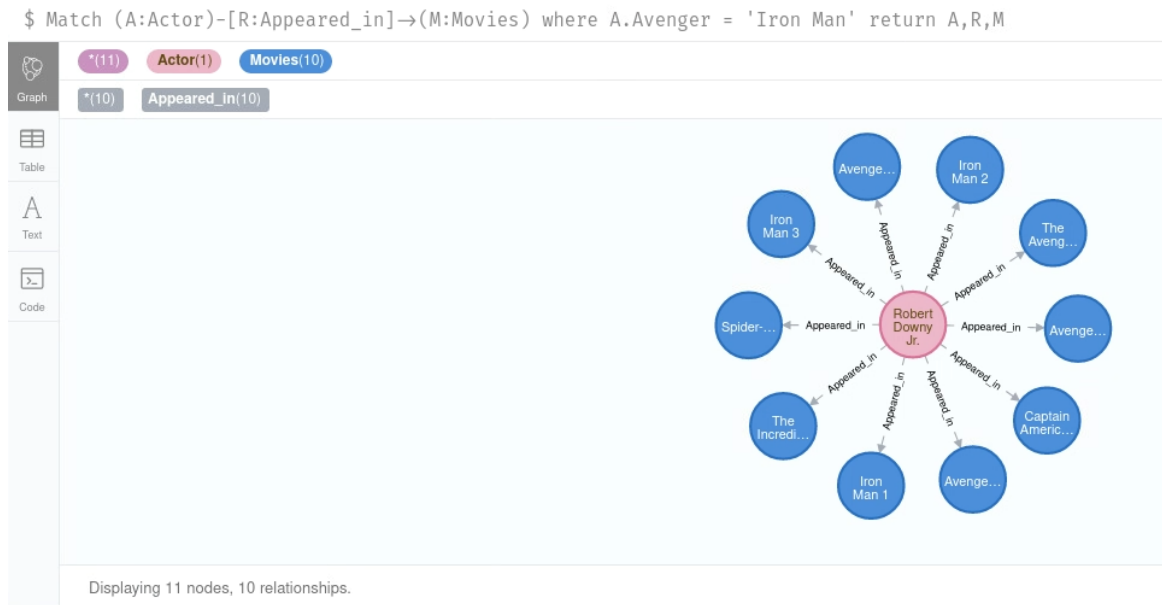


Figure 34 Movies that featured Iron Man

The figure 35 shows the actor, movie, and relationship in a graph visualization, the “Iron Man” avenger was played by Robert Downy Jr., and he appeared in several Marvel movies.

## 2. All movies that were directed by any of the Russo brothers.

This query shows all the movies that were directed by any of the Russo brothers (Anthony Russo and Joe Russo). The result is shown in figure 36.

*Match (D:Directors)-[R:Directed]->(M:Movies) where D.Name contains 'Russo' return M.Title, D.Name*

```
$ Match (D:Directors)-[R:Directed]-(M:Movies) where D.Name contains 'Russo' return M.Title, D.Name
```

M.Title	D.Name
"Avengers: Endgame"	"Joe Russo"
"Avengers: Infinity War"	"Joe Russo"
"Captain America: Civil War"	"Joe Russo"
"Captain America: The Winter Soldier"	"Joe Russo"
"Avengers: Endgame"	"Anthony Russo"
"Avengers: Infinity War"	"Anthony Russo"
"Captain America: Civil War"	"Anthony Russo"
"Captain America: The Winter Soldier"	"Anthony Russo"

Figure 35 Movies directed by any of the Russos

The result shows that both directors directed the same 4 movies in the Marvel universe.

## 3. Top 3 highest rated movies with their chronological order.

This query shows the 3 highest rated movies in the database along with their chronological order.

*Match (M:Movies) return M.Title, M.Rate, M.Chronological order by M.Rate desc limit 3*

\$ Match (M:Movies) return M.Title, M.Rate, M.Chronological order by M.Rate desc limit 3			
	M.Title	M.Rate	M.Chronological
Table			
Text	"Spider-Man: No Way Home"	8.6	27
Code	"Avengers: Infinity War"	8.5	22
	"Avengers: Endgame"	8.4	23

Figure 36 Top 3 rated movies

As shown in figure 37, the highest rated marvel movie is “Spider-Man: No Way Home”, which has an 8.6 rating and comes at number 27 in chronological order.

#### 4. The shortest path between “Robert Downy Jr.” and “Tom Holland”.

This query aims to show the shortest path between the actors Robert Downy Jr., and Tom Holland.

Match  $p = \text{shortestpath}((A:\text{Actor})-[*]-(A1:\text{Actor}))$  where  $A.\text{Name} = \text{'Tom Holland'}$  and  $A1.\text{Name} = \text{'Robert Downy Jr.'}$  return  $p$

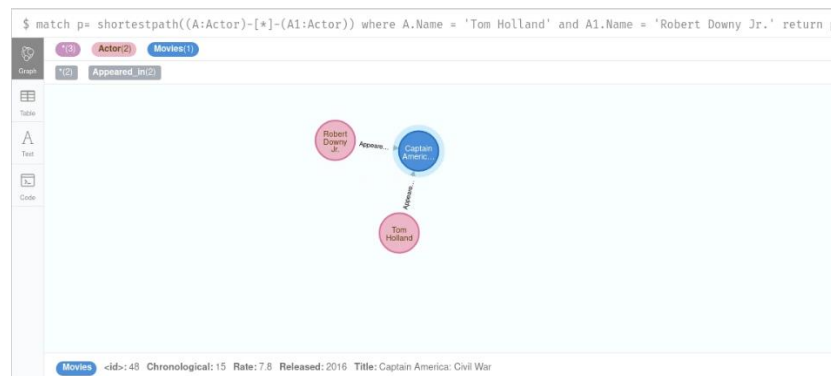


Figure 37 Shortest path between "Tom Holland" and "Robert Downy Jr."

The result in figure 38 shows that both actors featured in the movie “Captain America: Civil War” which was released in 2016. Although both actors featured in several movies, having a similar path, the query shows the shortest path as it was entered into the database, in this case the lowest chronological order.

#### 5. Movies rated higher than 8.0 in chronological order.

This query shows all the movies that have a higher rate than 8.0 in chronological order.

Match  $(M:\text{Movies})$  where  $M.\text{Rate} > 8$  return  $M.\text{Title}, M.\text{Rate}, M.\text{Chronological}$  order by  $M.\text{Chronological}$

\$ Match (M:Movies) where M.Rate > 8 return M.Title, M.Rate, M.Chronological order by M.Chronological			
	M.Title	M.Rate	M.Chronological
Table			
Text	"The Avengers"	8.1	7
Code	"Guardians of the Galaxy"	8.1	11
	"Avengers: Infinity War"	8.5	22
	"Avengers: Endgame"	8.4	23
	"Spider-Man: No Way Home"	8.6	27

Figure 38 Movies rated higher than 8.0 in chronological order

As shown in figure 39, the first movie in chronological order that has a rate higher than 8.0 is “The Avengers”, which has a rating of 8.1 and comes 7<sup>th</sup> in terms of chronological order.

#### 6. All the movies and actors in the movies that were directed by Jon Watts

This query shows all the movies that were directed by director Jon Watts along with the actors that featured in these movies. As shown in figure 40.

*Match (D:Directors)-[:Directed]->(M:Movies)<-[:Appeared\_in]-(A:Actor) where D.Name = 'Jon Watts' return M.Title, A.Name*

```
$ Match (D:Directors)-[:Directed]->(M:Movies)<-[:Appeared_in]-(A:Actor) where D.Name = 'Jon Watts' return M.Title, A.Name
```

	M.Title	A.Name
Table	"Spider-Man: No Way Home"	"Benedict Cumberbatch"
Text	"Spider-Man: No Way Home"	"Tom Holland"
Code	"Spider-Man: Far From Home"	"Tom Holland"
	"Spider-Man: Homecoming"	"Tom Holland"
	"Spider-Man: Homecoming"	"Robert Downy Jr."

Figure 39 All the movies and actors in movies directed by Jon Watts

The result shows that Jon Watts directed 3 movies, all focusing on the “Spider-Man” avenger, the movies featured the actors Benedict Cumberbatch in “Spider-Man: No Way Home”, Robert Downy Jr. in “Spider-Man: Homecoming”, and Tom Holland in all 3 movies who plays “Spider-Man”.

#### 7. All the movies that Benedict Cumberbatch featured in with the character he played in them.

This query explores the movies that featured Benedict Cumberbatch and the character he played in the movies. The result is shown in figure 41.

*Match (A:Actor)-[:Appeared\_in]->(M:Movies) where A.Name = 'Benedict Cumberbatch' return A.Name, A.Avenger, M.Title*

```
$ Match (A:Actor)-[:Appeared_in]->(M:Movies) where A.Name = 'Benedict Cumberbatch' return A.Name, A.Avenger, M.Title
```

	A.Name	A.Avenger	M.Title
Table	"Benedict Cumberbatch"	"Doctor Strange"	"Spider-Man: No Way Home"
Text	"Benedict Cumberbatch"	"Doctor Strange"	"Thor: Ragnarok"
Code	"Benedict Cumberbatch"	"Doctor Strange"	"Doctor Strange"
	"Benedict Cumberbatch"	"Doctor Strange"	"Avengers: Endgame"
	"Benedict Cumberbatch"	"Doctor Strange"	"Avengers: Infinity War"

Figure 40 Movies that featured Benedict Cumberbatch and the character he played in said movies

The query shows that Benedict Cumberbatch played the avenger “Doctor Strange” in 5 different movies, some of which are “Thor: Ragnarok” and “Avengers: Endgame”.

#### 8. The number of movies that Chris Evans featured in.

This query shows the number of movies where the actor Chris Evans featured in.

*Match (A:Actor)-[:Appeared\_in]->(M:Movies) where A.Name = 'Chris Evans' return A.Name, A.Avenger, count(M.Title) as Number\_of\_Movies*

```
$ Match (A:Actor)-[:Appeared_in]->(M:Movies) where A.Name = 'Chris Evans' return A.Name, A.Avenger, count(M.Title) as Number_of_Movies
```

	A.Name	A.Avenger	Number_of_Movies
Table	"Chris Evans"	"Captain America"	10
Text			

Figure 41 Number of movies that featured Chris Evans

As shown in figure 42, the actor Chris Evans played the avenger “Captain America” in 10 different Marvel movies.

#### 9. All the movies that featured the avengers “Doctor Strange” and “Spider-Man” together.

This query shows the movies that featured both avengers “Doctor Strange” and “Spider-Man” at the same time, the result of the query is shown in figure 43.

*Match (A:Actor)-[:Appeared\_in]->(M:Movies)<-[:Appeared\_in]-(A1:Actor) where A.Avenger = 'Doctor Strange' and A1.Avenger = 'Spider-Man' return M.Title*

\$ Match (A:Actor)-[:Appeared_in]->(M:Movies)<-[:Appeared_in]-(A1:Actor) where A.Avenger = 'Doctor Strange' and A1.Avenger='Spide...	
Table	M.Title
Text	"Avengers: Infinity War"
Code	"Spider-Man: No Way Home"
	"Avengers: Endgame"

Figure 42 Movies that featured both "Doctor Strange" and "Spider-Man"

Both avengers appeared in the same movie on 3 different occasions, these movies are “Avengers: Infinity War”, “Spider-Man: No Way Home”, and “Avengers: Endgame”.

#### 10. The lowest rated movie and the director of the movie.

This query requires two steps to be implemented properly, it aims to show the details of the lowest rated movie in the database, the first step is to get the lowest rate in the database as shown in figure 44, and the acquiring the details of the movie by specifying the rate as shown in figure 45.

*Match (M:Movies) return min(M.Rate)*

\$ Match (M:Movies) return min(M.Rate)	
Table	min(M.Rate)
Text	6.4

Figure 43 The lowest rated movie rate

*Match (M:Movies)<-[:Directed]-(D:Directors) where M.Rate = 6.4 return M.Title, D.Name, M.Released*

\$ Match (M:Movies)<-[:Directed]-(D:Directors) where M.Rate = 6.4 return M.Title, D.Name, M.Released			
Table	M.Title	D.Name	M.Released
Text	"Eternals"	"Chloe Zhao"	2021

Figure 44 The title, director and release date of the lowest rated movie

The result shows that the movie “Eternals” which was released in 2021 and directed by “Chloe Zhao” had the lowest rate in the Marvel industry with a rating of 6.4.