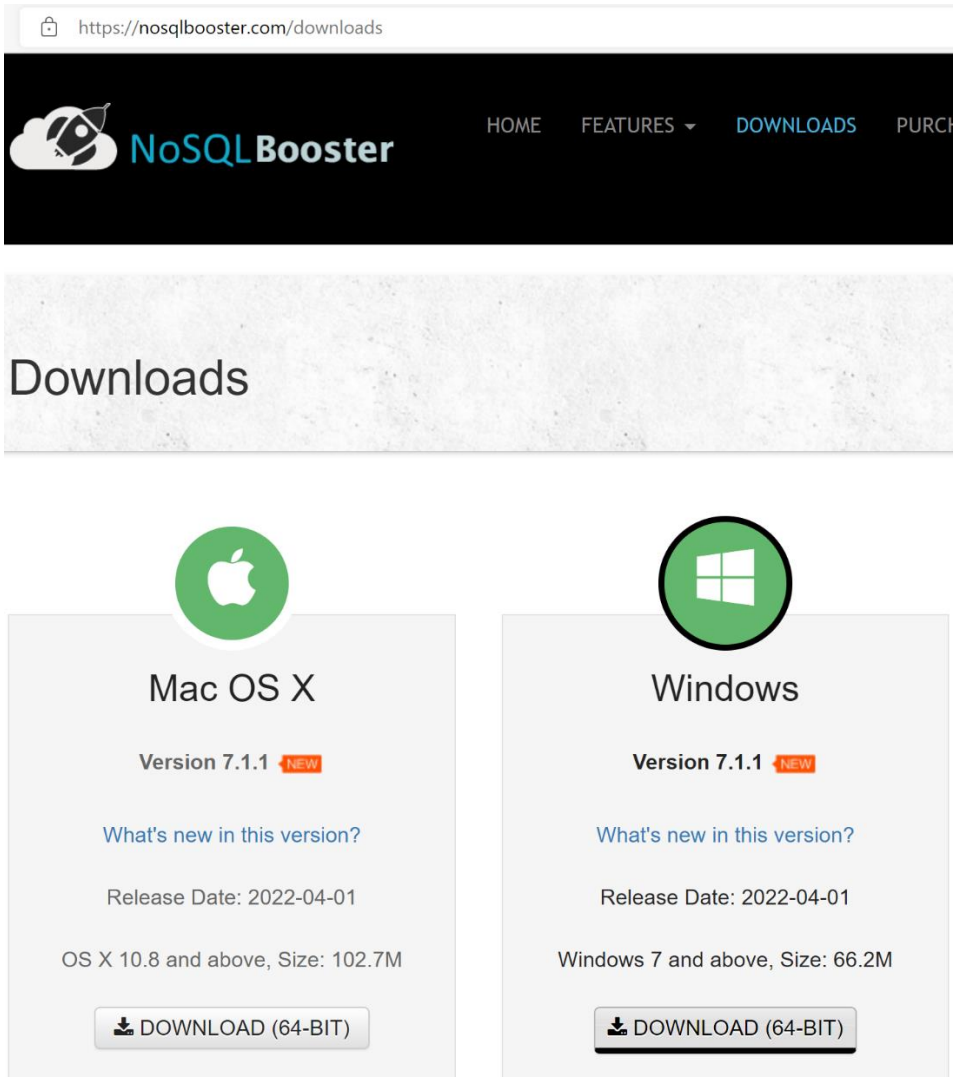
Tutorial - Week 11

Objectives:

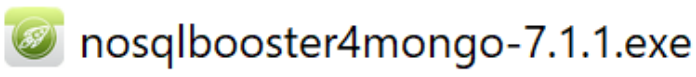
- Explore NoSQL database (MongoDB)
- Install and use a browser for MongoDB - NoSQLBooster
- Get understanding of JSON
- Revise theoretical concepts of NoSQL Databases

A. Download & Install

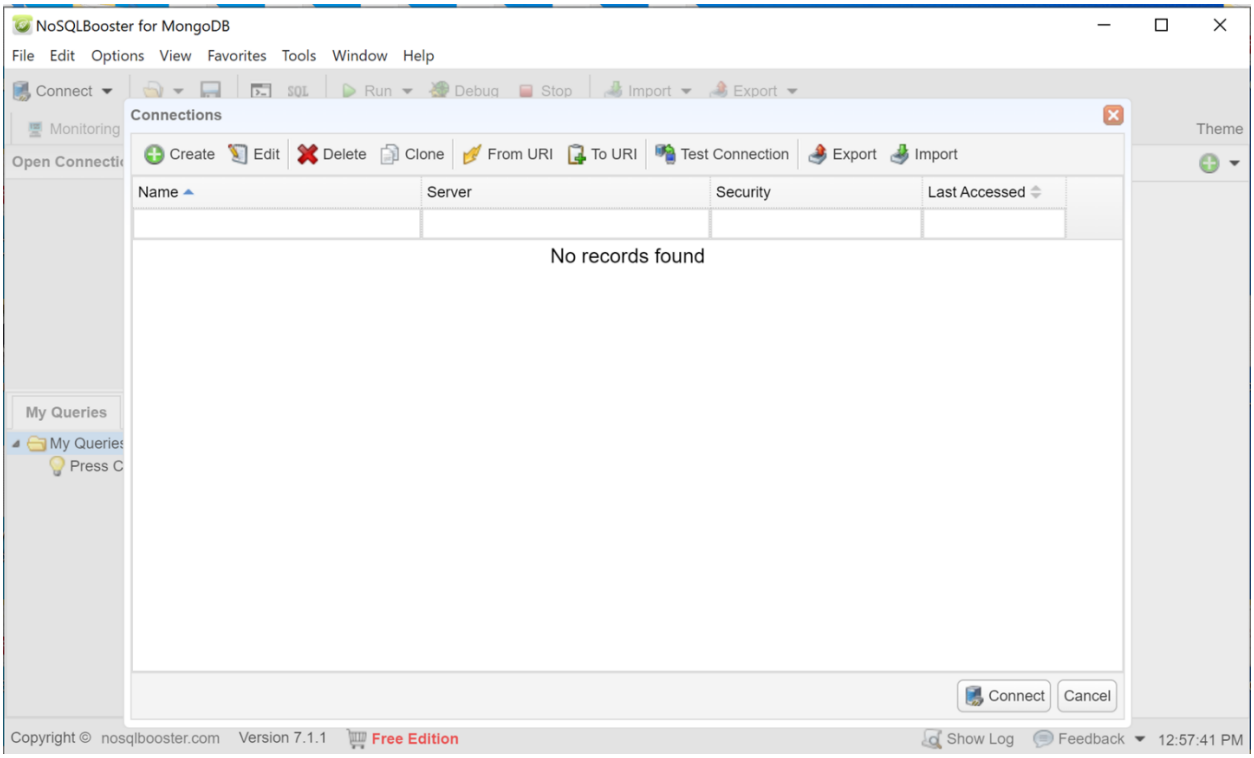
1. Go to: https://nosqlbooster.com/downloads (version 7.1.1).



2. Download the version relevant for your OS, run it to install (takes a few minutes). The screenshots below are for Windows OS. This is the downloaded software NoSQLBooster:

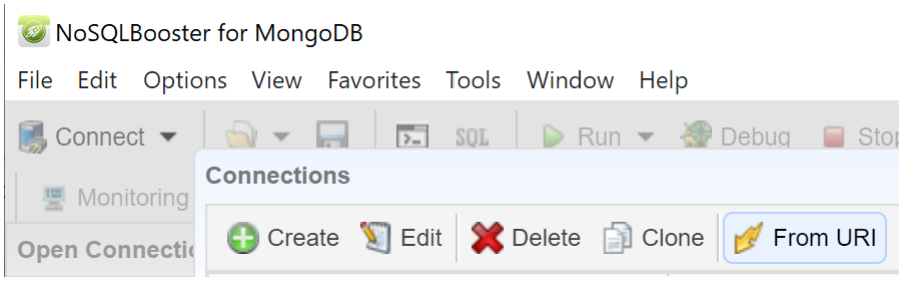


3. Start/run NoSQLBooster. It will take a few minutes then you will see something similar to the screenshot below.



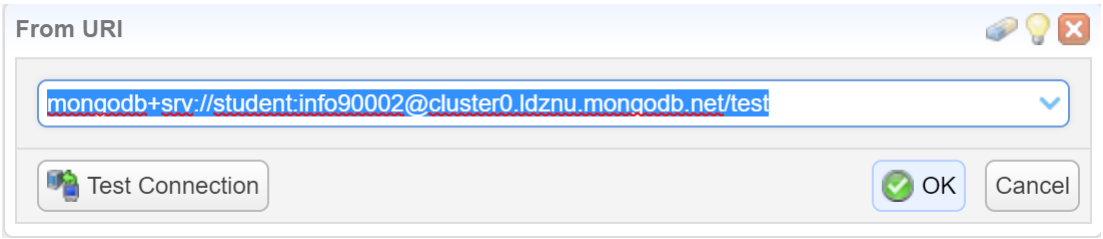
B. Connect to MongoDB

1. Click on the button 'From URI' (see screenshot below right)



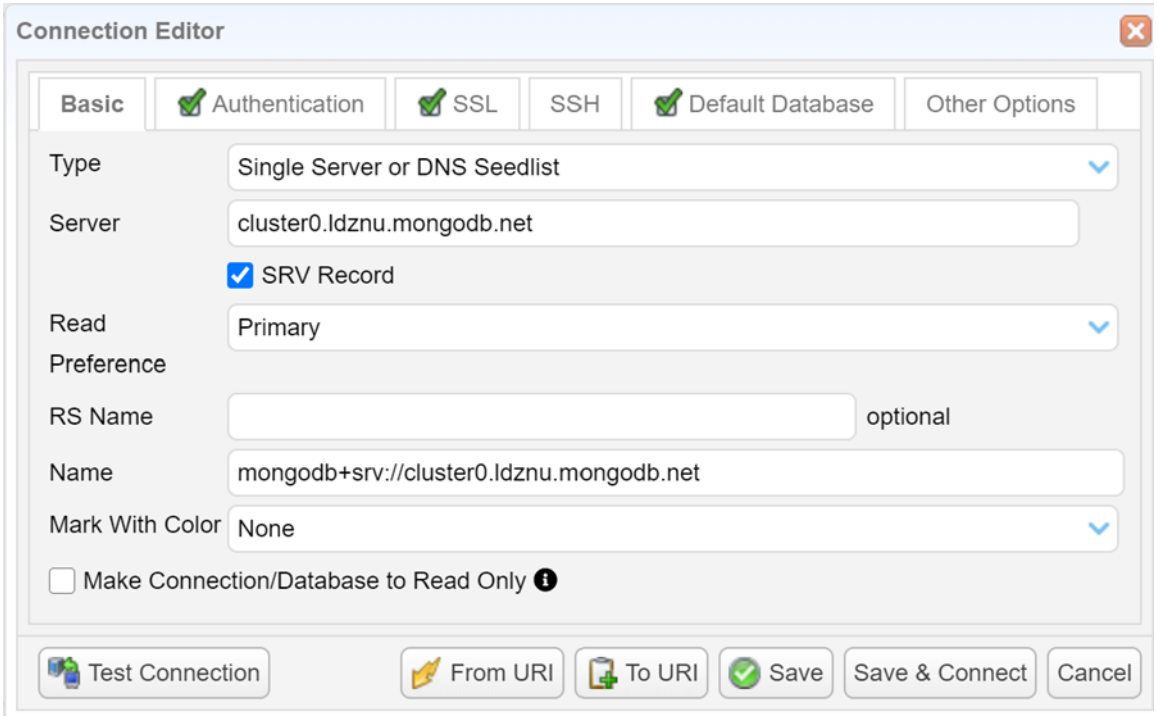
2. Copy and paste this connection string into the pop-up (**don't type it**):

   mongodb+srv://student:info90002@cluster0.ldznu.mongodb.net/test

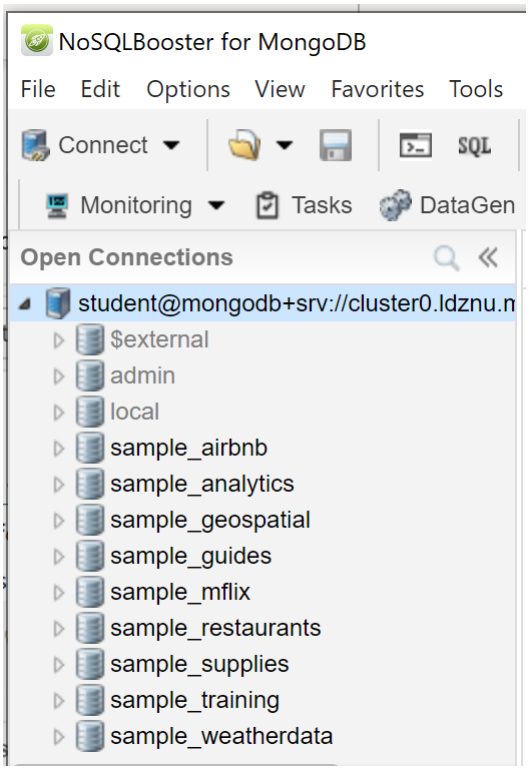


3. Click ‘OK’

4. You will be returned to the original window where you need to click on ‘Save & Connect’ (below right)

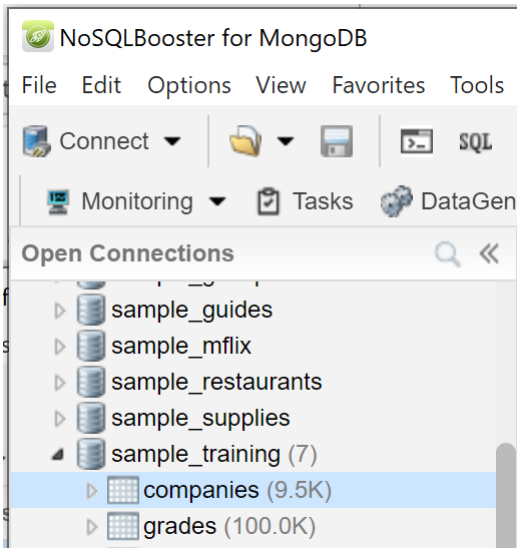


5. In the left pane you will see sample databases:

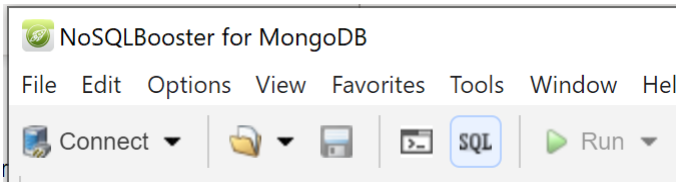


C. Explore MongoDB sample data using NoSQLbooster

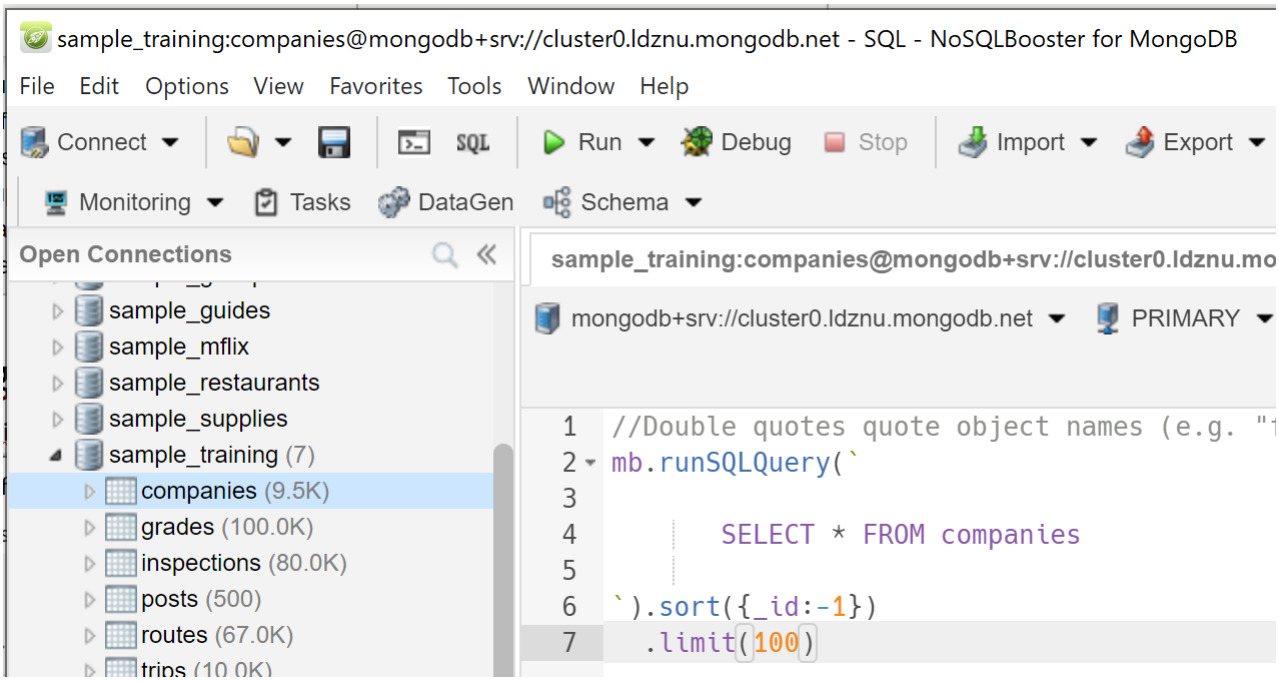
1. Select the database ‘sample_training’, then the collection ‘companies’



2. Click on the ‘**SQL**’ button (as shown below)

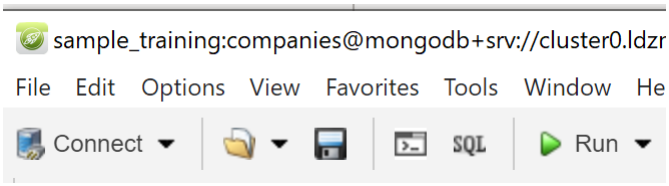


3. The browser will show a default SQL query.

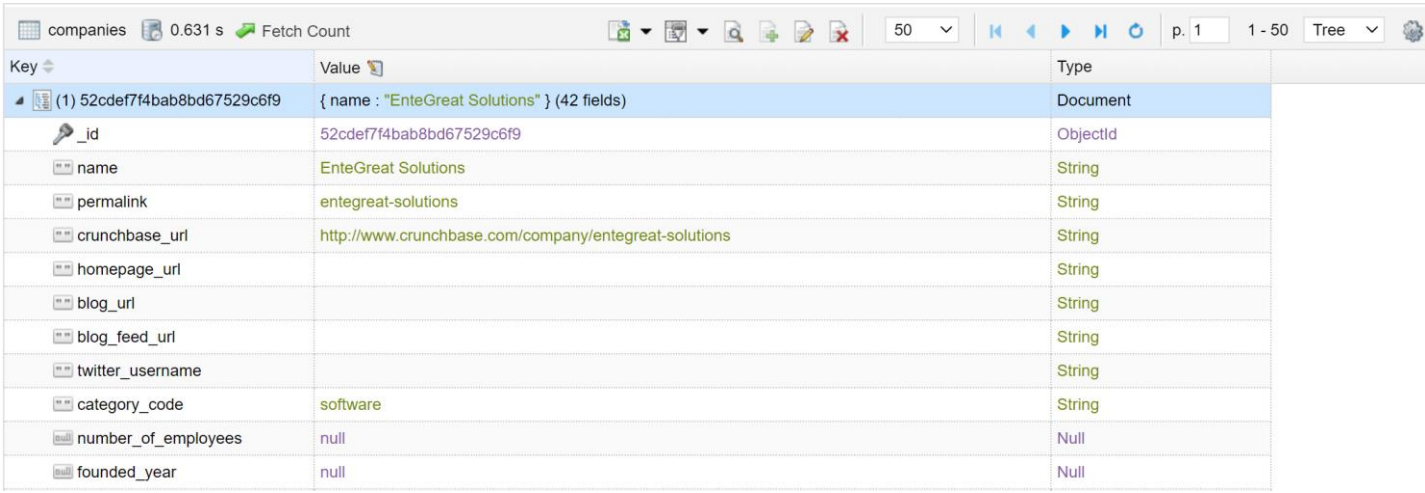


What is the default SQL query?

4. Execute the query by clicking the 'Run' button:
(next to the SQL button as in the screenshot below right)



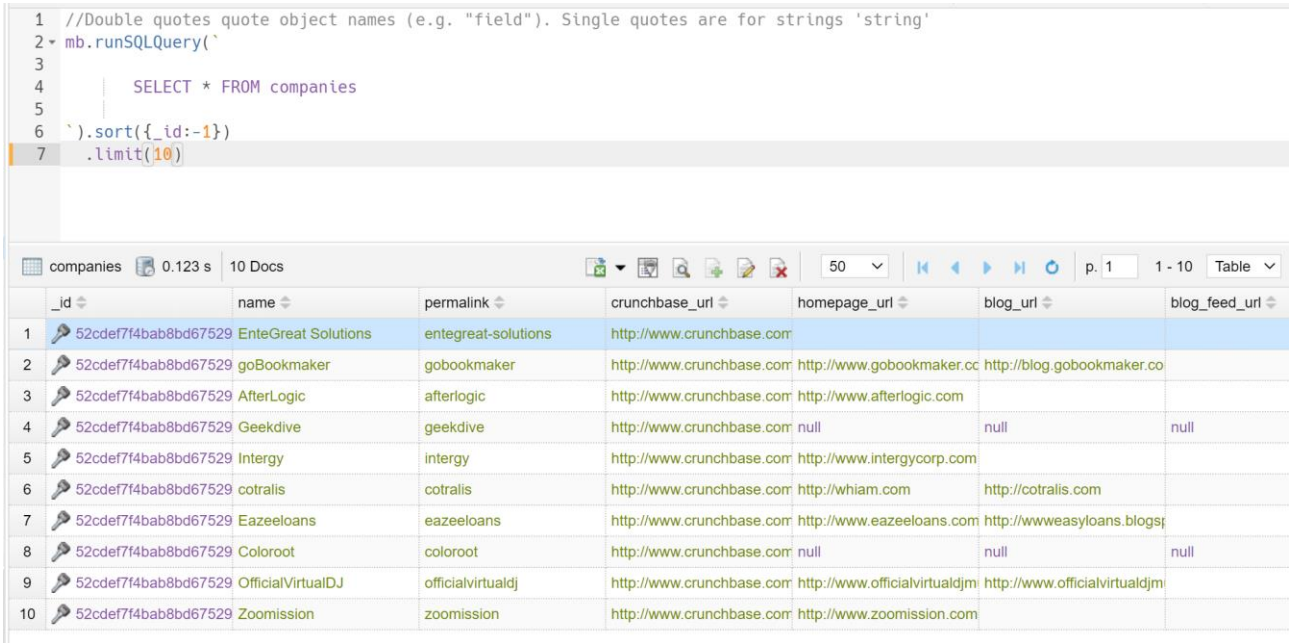
5. To see some company data (e.g. 'EnteGreat Solutions' below):



6. **This is 'Tree' view look at data types, how many are there? What types are they and what is the highest level (or parent)? Why is it called 'Tree'?**

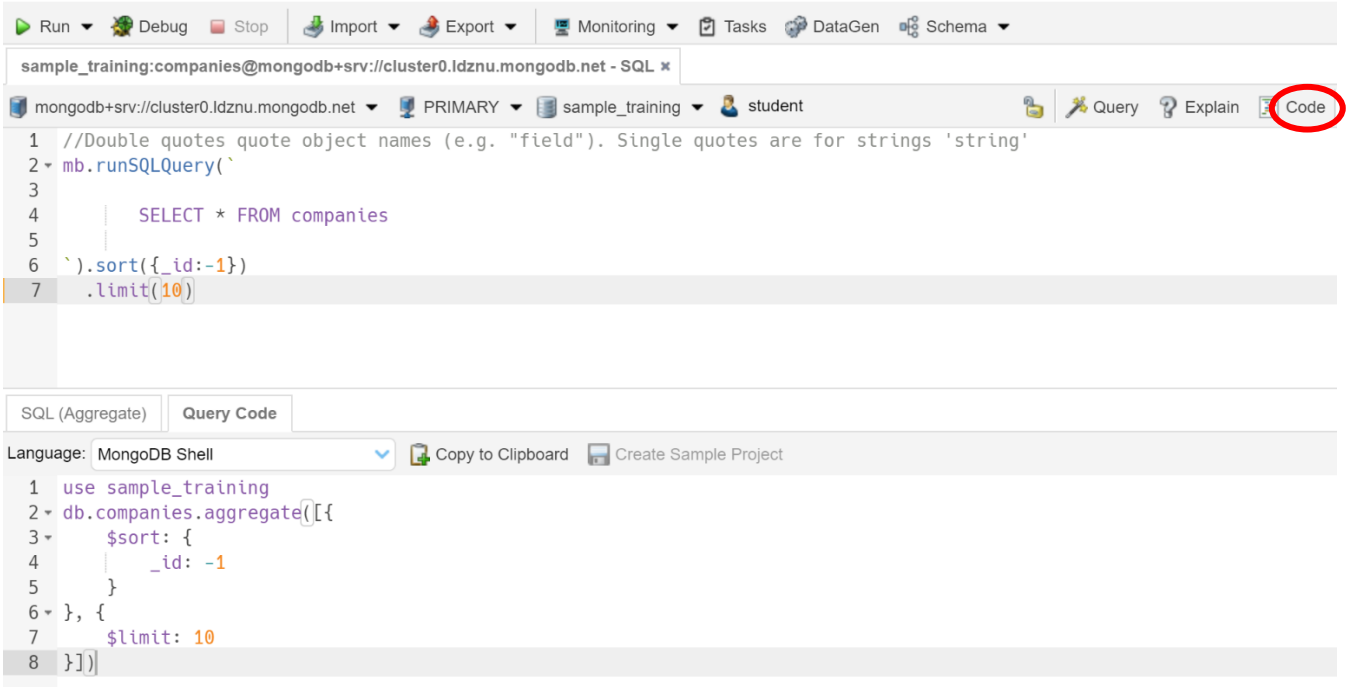
7. On the far right change 'Tree' to 'Table'

8. Now change limit to 10 and run again:



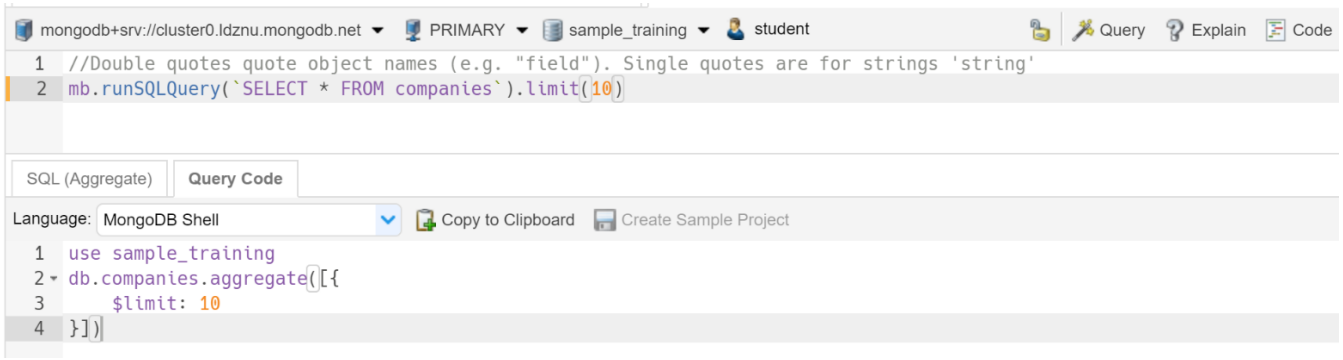
9. Now try 'JSON' view (far right).
Explore, note that data is in key:value pairs e.g. "name" : "EnteGreat Solutions" (and separated by commas). **Find 'Acquisitions', what data type is it?**

10. Now try 'Code' (button circled at the far right) to see:



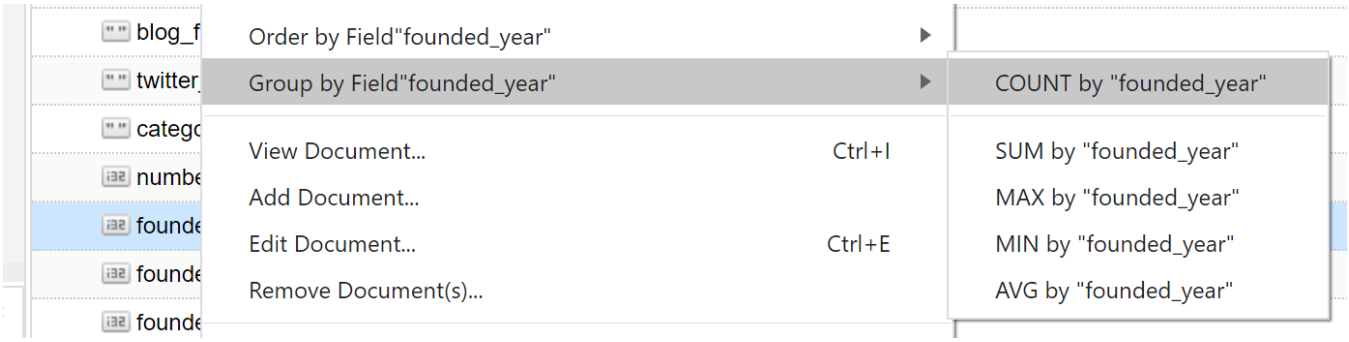
Obviously we have some sort of SQL above but what is the 'Query Code'?

11. Simplify this query so that there is no sort, just limit (you can use the 'Table' view to sort columns). Run to test if it's still working. Examine 'Query Code' again.



12. Now search for companies founded after 2010 using SQL. How many are there?

13. **You can achieve a one-click grouping/filtering of data fields**.
Switch to tree view and right click on 'founded_year' then 'Group by..' then 'COUNT..' (see screenshot below)



How many companies were founded after 2010? (and if the answer is different to the previous question.. review it).

14. //Double quotes quote object names (e.g. "field"). Single quotes are for strings 'string'

```
1  //Double quotes quote object names (e.g. "field"). Single quotes are for strings 'string'
2  mb.runSQLQuery(`SELECT * FROM companies`)
```

As above, on line 1, what does this mean?
Try a search to find companies that start with "E" (using SQL), how many are there?

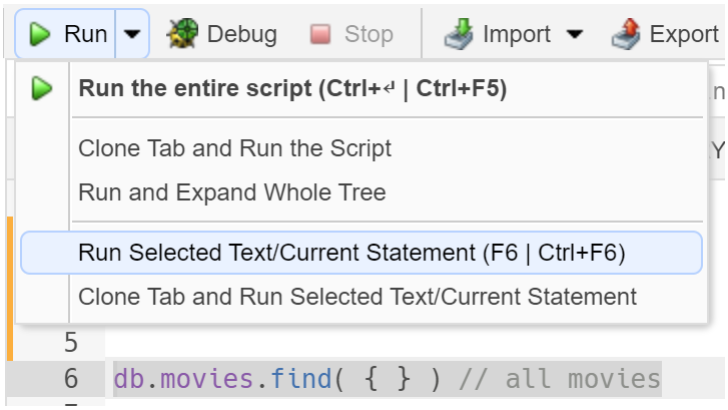
15. To the left of the SQL button is a code/shell button. Find and select the movies collection, then the shell button, then 'Run' to see (table view):

```
1  db.movies.find({})
2     .projection({})
3     .sort({_id:-1})
4     .limit(100)
```

movies 0.138 s 100 Docs 50 p. 1 1 - 5

	_id	plot	genres	runtime	rated	title	num_mflix
1	573a13fbf29313caabde	Sex and love. Some seek it	Array[3]	91	R	Scenes of a Sexual Nature	0
2	573a13fbf29313caabde		Array[1]	115		No Home Movie	0
3	573a13fbf29313caabde	Guy's tragic death is a shoc	Array[1]	102		Our Loved Ones	0
4	573a13faf29313caabde	Karol, an ordinary young m	Array[1]	90		The Red Spider	0
5	573a13faf29313caabde	A-Gu enlists a group of con	Array[1]	110		The Laundryman	1

16. Similar to MySQL, you can 'Run' all, or a selection. Change the script to database.movies.find() (as shown below), then click on 'Run Selected..'



Note the comment: // all movies - this is JavaScript (see the screenshot above).

17. Find your favourite movie e.g.

```
6  db.movies.find( { } ) // all movies
7
8  db.movies.find( { title: 'Raising Arizona'} ) // one movie
```

movies 0.106 s 1 Doc

	_id	plot	genres	runtime	metacritic	rated	cast
1	573a1398f29313caabce	When a childless couple of	Array[3]	94	55	PG-13	Array[4]

Note the key:value syntax e.g. title: 'Raising Arizona'

18. Find all 'G' rated movies. How many are there?

19. Answer question 18 using coding. Hint: replace 'find' with something else.

20. Notice that some fields have complex structure, here's one way to use imdb rating:

```
14 db.movies.find( { "imdb.rating": 9}
15
```

movies 0.156 s 11 Docs

		year	imdb	
			rating	votes
1	0:57:28.52700	1976	9	9,513 (9.5
2	8:01:02.66700	1982	9	9,551 (9.6
3	0:20:27.75300	1988	9	3,624 (3.6
4	0:16:52.17300	1996	9	61

21. How many shows have a rating of 2?

22. How to find the movies with best 'rating'?

```
18 db.movies.find( { type:"movie", "imdb.rating": { $gt: 9}} ) // best movies?
19
20
```

movies 0.198 s 6 Docs

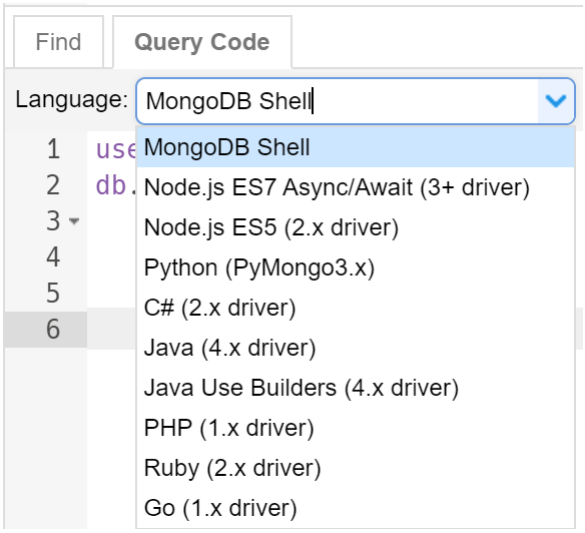
		imdb		year	plot	genres	rated	metacritic	title
	rating	votes	id						
1	9.4	45	3735302	2015	A documentary following th	Array[3]	PG-13		A Brave Heart: The Lizzie V
2	9.3	41	2313306	2015	The life of the greatest kara	Array[3]			The Real Miyagi
3	9.3	1,513,145	111161	1994	Two imprisoned men bond	Array[2]	R	80	The Shawshank Redemptic
4	9.3	1,521,105	111161	1994	Two imprisoned men bond	Array[2]	R	80	The Shawshank Redemptic
5	9.2	1,038,358	68646	1972	The aging patriarch of an or	Array[2]	R	100	The Godfather
6	9.1	700,857	71562	1974	The early life and career of	Array[2]	R	80	The Godfather: Part II

What is $gt?

23. Why are there TWO Shawshank Redemptions?

24. Who features in two of the worst movies (by imdb rating)?

For the programmers (and the curious), explore the various language options:



You can save your script (as .js)

D. Exercise. Choosing a NoSQL database

Libraries store information about their collections in their catalogue See example on the next page).

Match each of the following statements to the type of NoSQL database that would be best for storing that library's data. Select from the four types of NoSQL database discussed in lectures.

a. In one library, items are catalogued by author, title and publisher, as well as any number of other fields chosen by the cataloguer, such as physical description, subject codes and notes.
b. In another library, each catalogue record is stored in the MARC format (Figure 1), a coded text format that contains all the catalogue information for a particular item.
c. A public library wishes to store cover photos of all its items, which might be in JPEG, PNG or PDF format, or stored as a URL.
d. A university library wishes to keep track of which published academic papers reference each other in order to help researchers measure their metrics.

```
LEADER 00000nam  22000001  4500
008    730220s1955    ilu      b    00000 eng
019    55007351
050 0  QA276.5|b.R3
082    311.22
110 20 Rand Corporation.
245 12 A million random digits|bwith 100,000 normal deviates.
260 0  Glencoe, Ill.,|bFree Press|c[1955]
300    xxv, 400, 200 p.|c28 cm.
504    Bibliography: p. xxiv-xxv.
650  0 Numbers, Random.
984    |cMS T 519 R152
```

Figure 1: An example of a MARC record. MARC is a very old format that predates NoSQL, JSON and even XML by several decades, yet it remains the industry standard in library data systems.