*** Data Processing with Aggregation Operators ***

1. Make sure you have MongoDB Database Tools installed (https://docs.mongodb.com/database-tools/installation/installation/).

2. Make sure you have a local MongoDB instance running (see lab #2) or use the remote MongoDB Atlas instance (see lab #1).

3. Download "Books" sample data
https://github.com/ozlerhakan/mongodb-json-files

4. Use mongoimport tool to import the sample dataset
Syntax: mongoimport <options> <connection-string> <file>
mongoimport --db=books --collection=books
mongodb://mongoadmin:secret@localhost:27888/?authSource=admin books.json

```
PS C:\Program Files\MongoDB\Server\7.0\bin> mongoimport --db books --collection books C:\Users\razva\Documents\Master_Poli\Baze_date\books.json
2024-05-19T01:21:41.056+0300    connected to: mongodb://localhost/
2024-05-19T01:21:41.104+0300    431 document(s) imported successfully. 0 document(s) failed to import.
PS C:\Program Files\MongoDB\Server\7.0\bin>
```

5. Connect to MongoDB using shell
mongo mongodb://mongoadmin:secret@localhost:27888/?authSource=admin

6. See some sample documents, to get a taste of the sample data
> use books
> db.books.find({}).limit(3).pretty()

7. Let's find out the number of books in each individual state
> db.books.aggregate([
{$group : { _id: '$status',
count: {$sum:1} }}
]);

```
books> db.books.aggregate([
... {$group : { _id: '$status',
... count: {$sum:1} }}
... ]);
[ { _id: 'MEAP', count: 68 }, { _id: 'PUBLISH', count: 363 } ]
books>
```

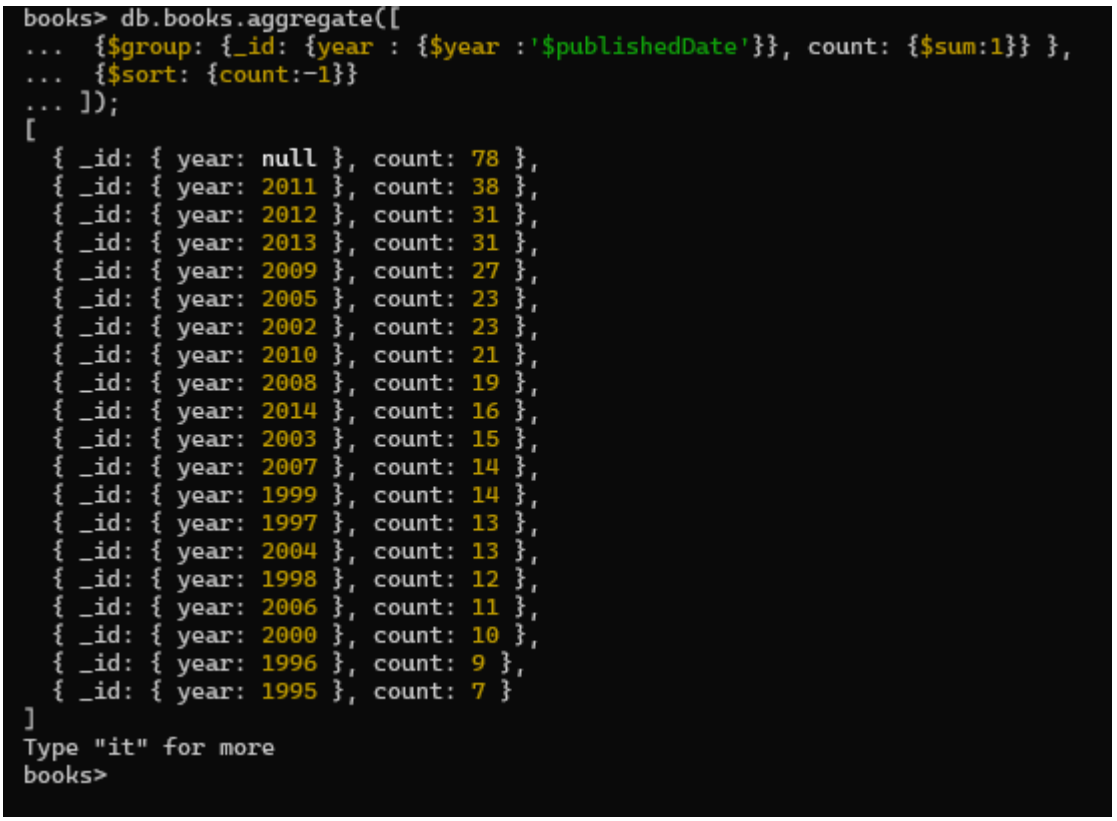
8. Now determine the number of books published each year

```
> db.books.aggregate([
   { $group: {_id: {year : {$year :'$publishedDate'}}, count: {$sum:1}} }
]);
```

```
books> db.books.aggregate([
... {$group : { _id: '$status',
... count: {$sum:1} }}
... ]);
[ { _id: 'MEAP', count: 68 }, { _id: 'PUBLISH', count: 363 } ]
books> db.books.aggregate([
...   { $group: {_id: {year : {$year :'$publishedDate'}}, count: {$sum:1}} }
... ]);
[
  { _id: { year: 2005 }, count: 23 },
  { _id: { year: 2014 }, count: 16 },
  { _id: { year: 1997 }, count: 13 },
  { _id: { year: 1996 }, count: 9 },
  { _id: { year: 1998 }, count: 12 },
  { _id: { year: 2004 }, count: 13 },
  { _id: { year: 2008 }, count: 19 },
  { _id: { year: 2001 }, count: 5 },
  { _id: { year: 2012 }, count: 31 },
  { _id: { year: 2000 }, count: 10 },
  { _id: { year: 2007 }, count: 14 },
  { _id: { year: 1993 }, count: 1 },
  { _id: { year: 2002 }, count: 23 },
  { _id: { year: 2011 }, count: 38 },
  { _id: { year: 1995 }, count: 7 },
  { _id: { year: 2006 }, count: 11 },
  { _id: { year: 1999 }, count: 14 },
  { _id: { year: 2009 }, count: 27 },
  { _id: { year: null }, count: 78 },
  { _id: { year: 2013 }, count: 31 }
]
Type "it" for more
books>
```

9. Nice, but we want the result sorted by year

```
> db.books.aggregate([
   {$group: {_id: {year : {$year :'$publishedDate'}}, count: {$sum:1}} },
   {$sort: {count:-1}}
]);
```



10. Notice that the highest number of books have been published in an unknown year (78 book is a null year). We want that year removed from our statistics.

```
> db.books.aggregate([
   {$match: { 'publishedDate' : {"$exists": true } } },
   {$group: {_id: {year : {$year :'$publishedDate'}}, count: {$sum:1}} },
   {$sort: {count:-1}}
]);
```

```
books> db.books.aggregate([
... {$match: { 'publishedDate' : {"$exists": true } } },
... {$group: {_id: {year : {$year :'$publishedDate'}}, count: {$sum:1}} },
... {$sort: {count:-1}}
... ]);
[
  { _id: { year: 2011 }, count: 38 },
  { _id: { year: 2012 }, count: 31 },
  { _id: { year: 2013 }, count: 31 },
  { _id: { year: 2009 }, count: 27 },
  { _id: { year: 2005 }, count: 23 },
  { _id: { year: 2002 }, count: 23 },
  { _id: { year: 2010 }, count: 21 },
  { _id: { year: 2008 }, count: 19 },
  { _id: { year: 2014 }, count: 16 },
  { _id: { year: 2003 }, count: 15 },
  { _id: { year: 2007 }, count: 14 },
  { _id: { year: 1999 }, count: 14 },
  { _id: { year: 1997 }, count: 13 },
  { _id: { year: 2004 }, count: 13 },
  { _id: { year: 1998 }, count: 12 },
  { _id: { year: 2006 }, count: 11 },
  { _id: { year: 2000 }, count: 10 },
  { _id: { year: 1996 }, count: 9 },
  { _id: { year: 1995 }, count: 7 },
  { _id: { year: 2001 }, count: 5 }
]
Type "it" for more
books>
```

11. We want to get the number of books written by each of the authors

```
> db.books.aggregate([
   {$group: {_id: '$authors', count: {$sum:1}} },
   {$sort: {count:-1}}
]);
```

```
books> db.books.aggregate([
... {$group: {_id: '$authors', count: {$sum:1}} },
... {$sort: {count:-1}}
... ]);
[
  { _id: [], count: 37 },
  { _id: [ 'Vikram Goyal' ], count: 12 },
  { _id: [ 'Richard Siddaway' ], count: 3 },
  { _id: [ 'Ted Neward' ], count: 3 },
  { _id: [ 'David A. Black' ], count: 3 },
  { _id: [ 'Jon Skeet' ], count: 3 },
  { _id: [ 'Christian Bauer', 'Gavin King' ], count: 3 },
  { _id: [ 'Tim Hatton' ], count: 3 },
  { _id: [ 'Mala Gupta' ], count: 2 },
  { _id: [ 'Chris Buckett' ], count: 2 },
  { _id: [ 'Steven J. Gutz' ], count: 2 },
  { _id: [ 'Pete Brown' ], count: 2 },
  { _id: [ 'Amit Rathore' ], count: 2 },
  { _id: [ 'Ramnivas Laddad' ], count: 2 },
  { _id: [ 'Peter Armstrong' ], count: 2 },
  { _id: [ 'Alex Holmes' ], count: 2 },
  { _id: [ 'Benjamin G. Sullins', 'Mark B. Whipple' ], count: 2 },
  { _id: [ 'Don Jones' ], count: 2 },
  { _id: [ 'Bear Bibeault', 'Yehuda Katz' ], count: 2 },
  { _id: [ 'Craig Walls' ], count: 2 }
]
Type "it" for more
books>
```

12. Notice that not only individual authors have been counted but also groups of authors. We still want individual authors and for that we need to explode ($unwind) the authors array.

```
> db.books.aggregate([
   {$unwind: '$authors' },
   {$group: {_id: '$authors', count: {$sum:1}} },
   {$sort: {count:-1}}
]);
```

```
books> db.books.aggregate([
...     {$unwind: '$authors' },
...   {$group: {_id: '$authors', count: {$sum:1}} },
... {$sort: {count:-1}}
... ]);
[
  { _id: '', count: 59 },
  { _id: 'Vikram Goyal', count: 12 },
  { _id: 'Don Jones', count: 6 },
  { _id: 'Richard Siddaway', count: 6 },
  { _id: 'Christian Bauer', count: 5 },
  { _id: 'Jon Skeet', count: 5 },
  { _id: 'Yehuda Katz', count: 5 },
  { _id: 'Gavin King', count: 5 },
  { _id: 'Erik Hatcher', count: 4 },
  { _id: 'Greg Low', count: 4 },
  { _id: 'Kalen Delaney', count: 4 },
  { _id: 'Craig Walls', count: 4 },
  { _id: 'Matthew Scarpino', count: 3 },
  { _id: 'Paul S. Randal', count: 3 },
  { _id: 'Adam Machanic', count: 3 },
  { _id: 'Jeffery Hicks', count: 3 },
  { _id: 'W. Frank Ableson', count: 3 },
  { _id: 'Shannon Appelcline', count: 3 },
  { _id: 'Robi Sen', count: 3 },
  { _id: 'Gary Gregory', count: 3 }
]
Type "it" for more
books>
```

DO IT YOURSELF:

A. Find out the number of books for individual authors, excluding empty ones. Hint: start from the command #12 and match the authors that are not equal to an empty string.

```
books> db.books.aggregate([
...     {$unwind: '$authors'},
...     {$match: {authors: {$ne: ""}}},
...     {$group: {_id: '$authors', count: {$sum: 1}}},
...     {$sort: {count: -1}}
... ]);
[
  { _id: 'Vikram Goyal', count: 12 },
  { _id: 'Richard Siddaway', count: 6 },
  { _id: 'Don Jones', count: 6 },
  { _id: 'Gavin King', count: 5 },
  { _id: 'Jon Skeet', count: 5 },
  { _id: 'Yehuda Katz', count: 5 },
  { _id: 'Christian Bauer', count: 5 },
  { _id: 'Craig Walls', count: 4 },
  { _id: 'Greg Low', count: 4 },
  { _id: 'Kalen Delaney', count: 4 },
  { _id: 'Erik Hatcher', count: 4 },
  { _id: 'David A. Black', count: 3 },
  { _id: 'Jeffrey Palermo', count: 3 },
  { _id: 'Ted Neward', count: 3 },
  { _id: 'Christopher Allen', count: 3 },
  { _id: 'Tim Hatton', count: 3 },
  { _id: 'Kimberly L. Tripp', count: 3 },
  { _id: 'Daniel Minoli', count: 3 },
  { _id: 'Dave Crane', count: 3 },
  { _id: 'Jimmy Bogard', count: 3 }
]
Type "it" for more
books>
```

B. For each individual category, find out the total number of published pages from all books. Hint: Expand categories then group and sort by sum of pages.

```
books> db.books.aggregate([
...     {$unwind: '$categories'},
...     {$group: {_id: '$categories', totalPages: {$sum: '$pageCount'}}},
...     {$sort: {totalPages: -1}}
... ]);
[
  { _id: 'Java', totalPages: 39573 },
  { _id: 'Internet', totalPages: 18091 },
  { _id: 'Microsoft .NET', totalPages: 14859 },
  { _id: 'Web Development', totalPages: 7505 },
  { _id: 'Client-Server', totalPages: 5676 },
  { _id: 'Business', totalPages: 4850 },
  { _id: 'Software Engineering', totalPages: 4604 },
  { _id: 'Microsoft', totalPages: 4579 },
  { _id: 'Programming', totalPages: 4346 },
  { _id: 'Computer Graphics', totalPages: 3122 },
  { _id: 'PowerBuilder', totalPages: 3036 },
  { _id: 'Theory', totalPages: 2943 },
  { _id: 'Python', totalPages: 2894 },
  { _id: 'Networking', totalPages: 2565 },
  { _id: 'Perl', totalPages: 2312 },
  { _id: 'XML', totalPages: 1928 },
  { _id: 'Mobile Technology', totalPages: 1779 },
  { _id: 'Object-Oriented Programming', totalPages: 1634 },
  { _id: 'Miscellaneous', totalPages: 1412 },
  { _id: 'Open Source', totalPages: 948 }
]
Type "it" for more
books>
```

NEXT:
We will explore time series collections. Familiarize yourself with the topic at
https://docs.mongodb.com/manual/core/timeseries-collections/