MongoDB의 다양한 Index

2 **Compound Index와 ESR Rule**

Compound Index

```
db.products.createIndex( { "item": 1, "stock": 1, "price": 1 } )
```

```
# 위의 인덱스를 사용할 수 이는 쿼리
> db.products.find( { item: "Banana" } )
> db.products.find( { item: "Banana", stock: { $gt: 5 } } )
> db.products.find( { item: "Banana", stock: { $gt: 5 }, price: { $gte: 10000 } } )
```

아래와 같은 Index를 따로 만들어줄 필요가 없다.

{item: 1}
{item: 1, stock: 1}

E-S-R Rule

E	**Equality** First
E → R	**Equality** Before **Range**
E → S	**Equality** Before Sort
S → R	Sort Before **Range**
E → S → R	**Equality** Sort **Range**

db.games.createIndex({gamertag: 1, level: 1})
```
db.games.find({gamertag: "Ace", level: {$gt: 50}})
```

db.games.createIndex({gamertag: 1, score: 1})
```
db.games.find({gamertag: "Ace"}).sort({score: 1})
```

db.games.createIndex({score: 1, level: 1})
```
db.games.find({level: {$gt: 50}}).sort({score: 1})
```

db.games.createIndex({gamertag: 1, score: 1, level: 1})
```
db.games.find({gamertag: "Ace", level: {$gt: 50}}).sort({score: 1})
```

E → R Equality Before Range

```
db.games.find({gamertag: "Ace", level: {$gt: 50}})
```

gamertag	Ace			Bob	Kim		Tom		Z
level	15	60	77	17	15	24	58	60	7

level	7	15		17	24	58	60		77
gamertag	Z	Ace	Kim	Bob	Kim	Tom	Ace	Tom	Ace

```
db.games.find({gamertag: "Ace"}).sort({score: 1})
```

gamertag	Ace			Bob	Kim		Tom		Z
score	500	1500	2000	2000	1500	1700	1600	2000	5000

score	500	1500		1600	1700	2000			5000
gamertag	ACE	ACE	Kim	Tom	Kim	Ace	Bob	Tom	Z

S → R Sort Before Range

```
db.games.find({level: {$gt: 50}}).sort({score: 1})
```

score	500	1500		1600	1700		2000		5000
level	60	15	24	58	15	17	60	77	7

level	7	15		17	24	58	60	77
score	5000	1500	1700	2000	1500	1600	500	2000	2000

```
db.games.find({gamertag: "Ace", level: {$gt: 50}}).sort({score: 1})
```

gamertag	Ace			Bob	Kim		Tom		Z
score	500	1500	2000	2000	1500	1700	1600	2000	5000
level	60	15	77	17	24	15	58	60	7

E-S-R Rule이 항상 성립할까?

```
db.games.find({gamertag: "Ace", date: {$gte: 2022}}).sort({score: 1})
```

gamertag	Ace					Tom	Z
score	1	2	⋯	5000	⋯	9001	2000	5000
date	2001	2000	⋯	2022	⋯	2013		

Returning Documents : 1
Execution Time: 23ms
Index Keys Examined : 9001
Total Document Examined : 1

gamertag	Ace					Tom	Z
date	1999	2000	⋯	2015	⋯	2022	2022	2022

Returning Documents : 1
Execution Time: 0ms
Index Keys Examined : 1
Total Document Examined : 1