SQL E. F. Codd

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 SQL SQL SQL

data structure

""""row"" C struct Java class table `Student[]` SQL

```
CREATE TABLE Students ( sid CHAR(20),
                        name CHAR(20),
                        login CHAR(20),
                        age INTEGER,
                        gpa REAL )
```

 C

```
struct student {
  char* sid;
  char* name;
  char* login;
  int age;
  double gpa;
}
```

"key" C `char* p`"join"""dereference C `*p`join join ""index

query filter, map SQL

```
SELECT Book.title
 FROM Book
 WHERE price > 100
```

 Lisp

```
(map book-title
     (filter (lambda (b) (> (book-price b) 100)) Book)
```

 SQL Lisp SQL SQL Lisp

 SQL Lisp """"

 Lisp

"""" 90 B A"foreign key" B B key key "normalization" ;)

normalization C C ""

Data Model""""

""""""" ;)

"" ;)

NoSQL

 E. F. Codd SQL SQL"""""" ;)

 SQL "NoSQL " NoSQL "" NoSQL NoSQL SQL

 SQL ""column-based database Vertica, HBase """""" N key normalization key N

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 NoSQL Neo4j, MongoDB SQL Neo4j Cypher Java ""extensionMongoDB JSON AST

NoSQL

""RPC"" SQL "" SQL ""NoSQL SQL "RPC"

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""""""NoSQL"