LET'S GO!!
HAPPY PHPING!

MySQL

杨亮

关系数据库

MySQL®

百度对DBA的要求

通读MySQL代码

- 开源：代码面前了无秘密
- 体积小：安装方便，快捷，无严格要求
- 性能足可以与商业数据库（如Oracle）媲美
- 开源社区提供了丰富的扩展功能
- 简单易用，跨平台，支持多用户

2009年被美国甲骨文Oracle收购

2008年被美国Sun收购

瑞典 MySQL AB公司

关系

id	name	age	gender	dept	phone
1	张三	25	男	开发部	137XXX
2	李四	27	男	开发部	135XXX
3	王五	24	男	市场部	130XXX
4	赵六	25	女	商场部	151XXX

SQL: Structured Query Language

3000+练习

Data Definition Language

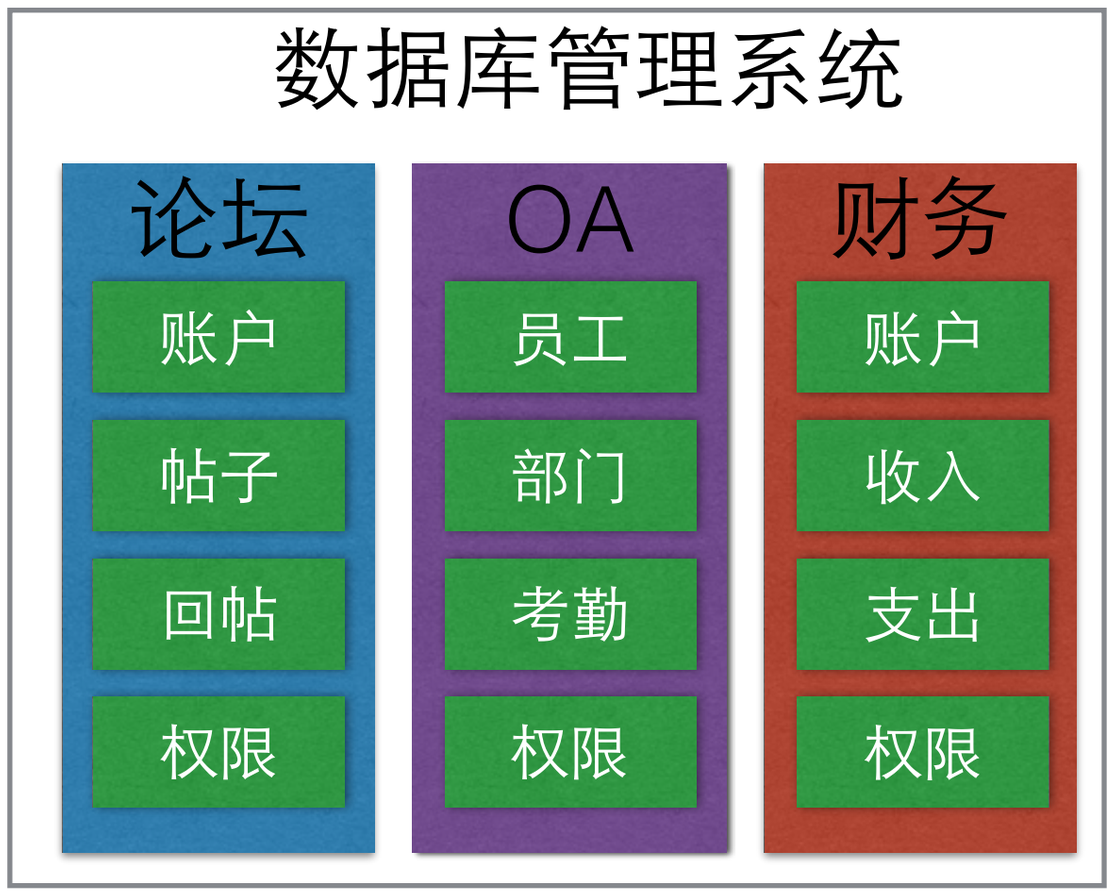
进行与数据库或表结构有关的操作

Data Manipulation Language

进行数据的增、删、改、查

Data Control Language

与数据库管理系统相关的设置



一个数据库中放置与仅一个系统相关的所有表

id	name	age	gender	dept	phone
1	张三	25	男	开发部	137XXX
2	李四	27	男	开发部	135XXX
3	王五	24	男	市场部	130XXX
4	赵六	25	女	商场部	151XXX

访问MySQL的三种方式

命令行 (强烈推荐)

用户名（Username）密码（Password）

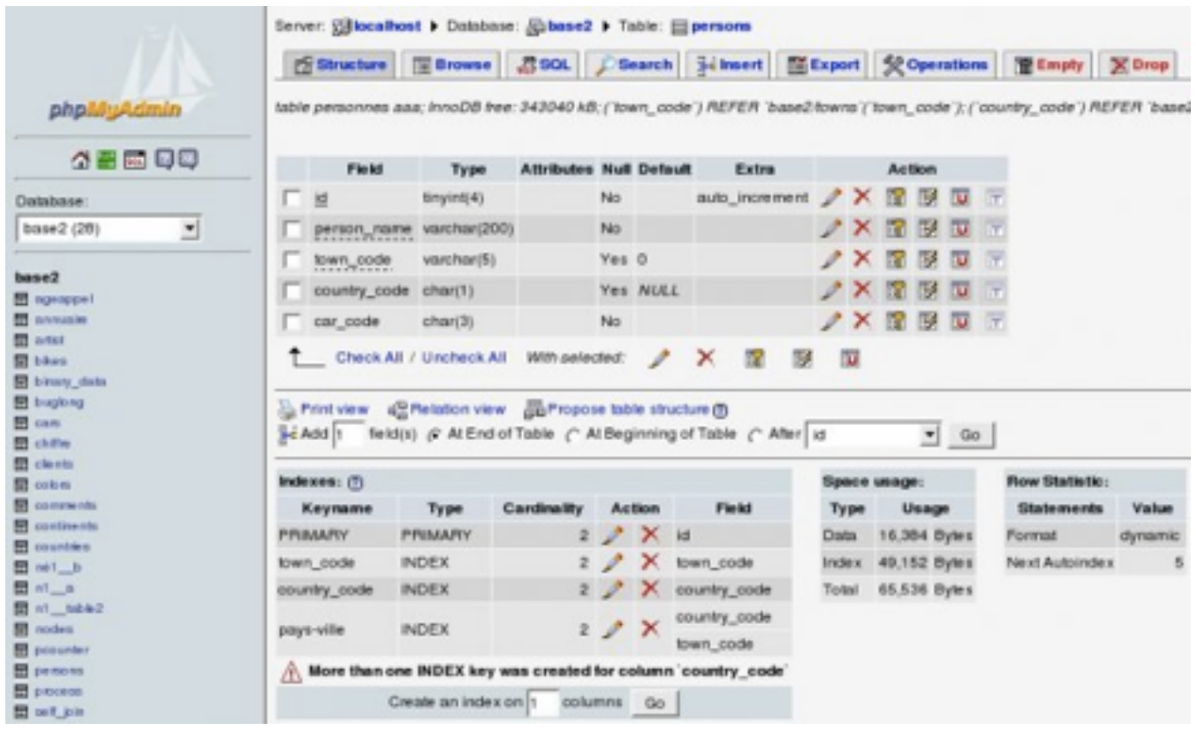
```
mysql  -h127.0.0.1  -P3306  -uroot  -p123456
```

IP地址（host）　　端口（Port）

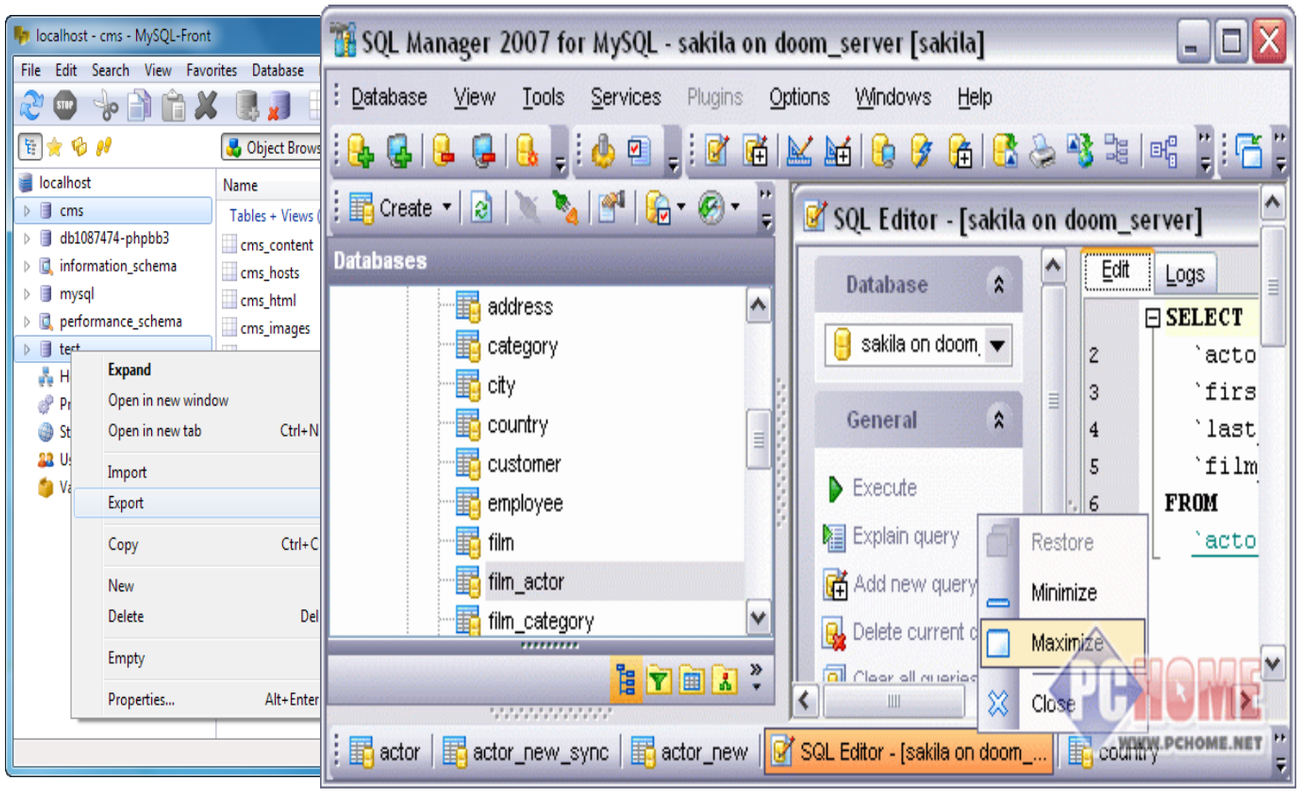
如果是服务器上的命令行可使用localhost

3306是默认端口，可以省略

浏览器（phpMyAdmin）



客户端 (不推荐)



字符集

int -> character

latin1:西欧希腊字符
gbk:简体中文
big5:繁体中文
utf8:所有国家的字符

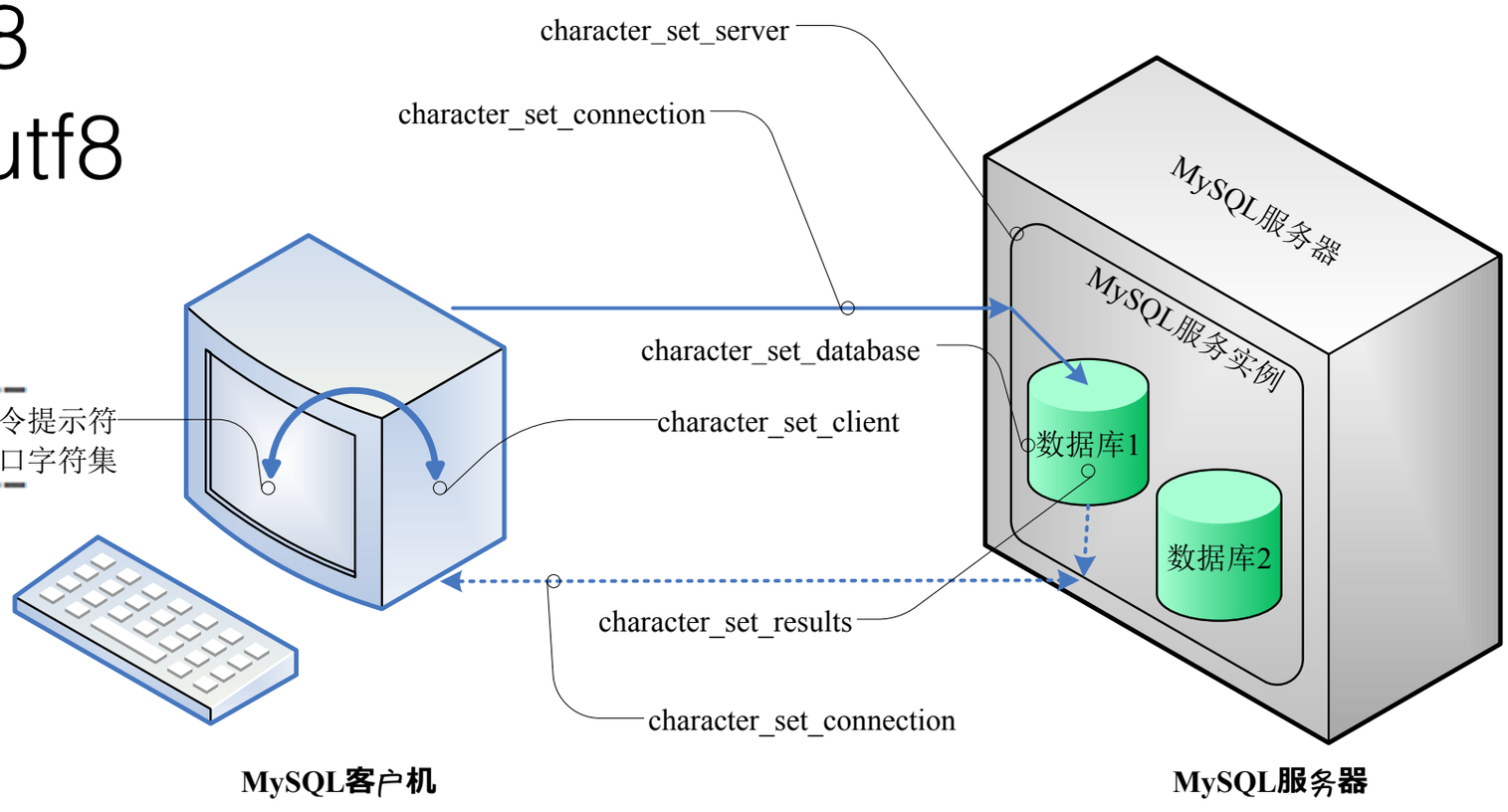
ASCII TABLE

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[ENG OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]

各种乱码的解决方法

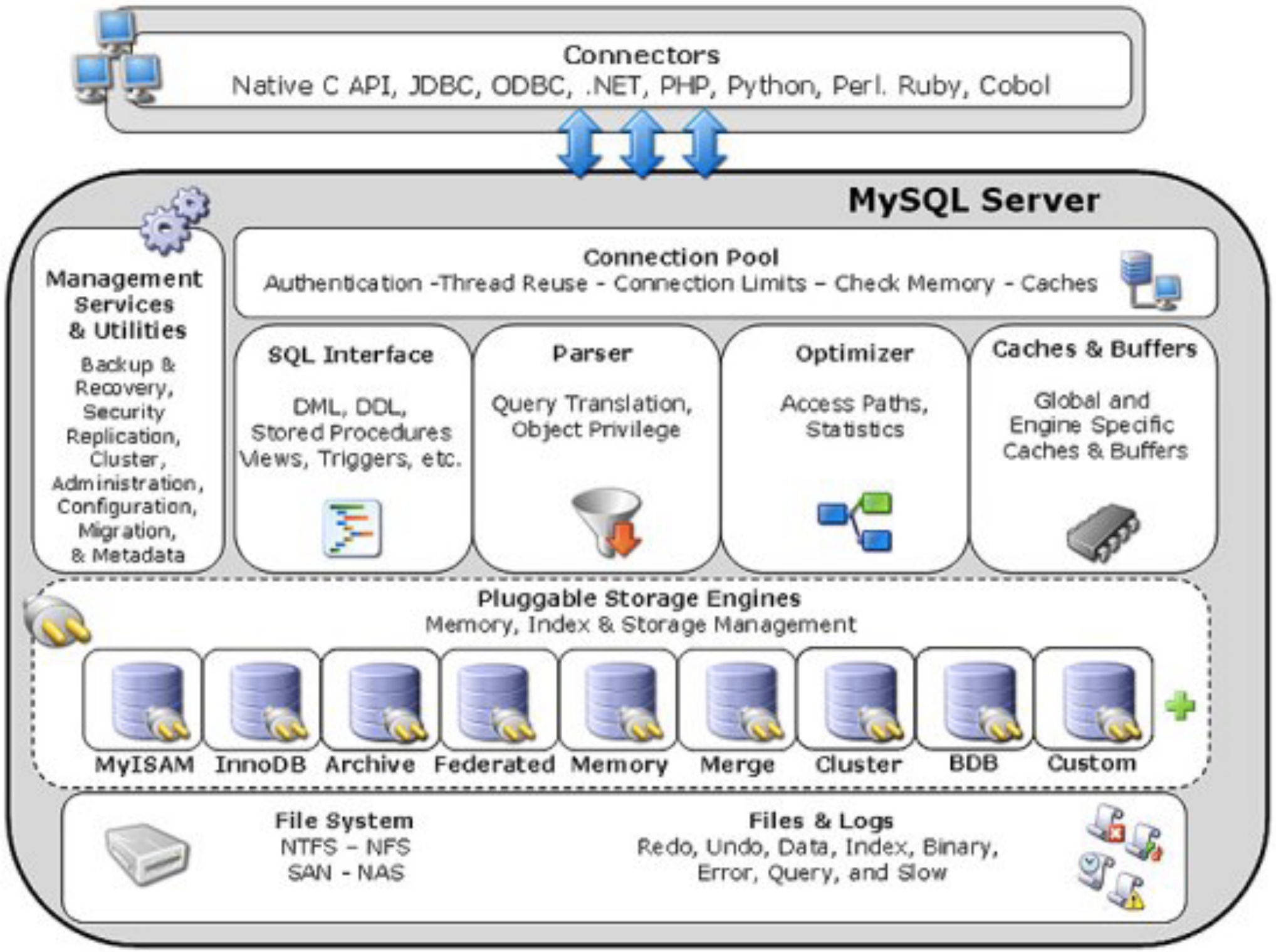
1：所有数据库、表、字段都用utf8
2：所有html页面都用utf8
3：所有的PHP页面都用utf8

```
mysql> show variables like 'character%';
+--------------------------+----------+
| Variable_name            | Value    |
+--------------------------+----------+
| character_set_client     | utf8     |
| character_set_connection | utf8     |
| character_set_database   | latin1   |
| character_set_filesystem | binary   |
| character_set_results    | utf8     |
| character_set_server     | latin1   |
| character_set_system     | utf8     |
```



MySQL Architecture

分层



存储引擎

负责具体的数据存储与查询

不同表可以使用不同的存储引擎

MyISAM	InnoDB
不支持外键	支持外键
不支持事务	支持事务
select性能较高	频繁增删改查
MySQL原生	第三方扩展

年	制造商	型号	说明	价值
1997	Ford	E350	ac, abs, moon	3000
1999	Chevy	Venture "Extended Edition"		4900
1999	Chevy	Venture "Extended Edition, Very Large"		5000
1996	Jeep	Grand Cherokee	MUST SELL! air, moon roof, loaded	4799

```
年,制造商,型号,说明,价值
1997,Ford,E350,"ac, abs, moon",3000
1999,Chevy,"Venture ""Extended Edition""",,4900
1999,Chevy,"Venture ""Extended Edition, Very Large""",,5000
1996,Jeep,Grand Cherokee,"MUST SELL! air, moon roof, loaded",4799
```

.CSV

```
+--------------------+---------+----------------------------------------------------------------+--------------+------+------------+
| Engine             | Support | Comment                                                        | Transactions | XA   | Savepoints |
+--------------------+---------+----------------------------------------------------------------+--------------+------+------------+
| FEDERATED          | NO      | Federated MySQL storage engine                                 | NULL         | NULL | NULL       |
| MRG_MYISAM         | YES     | Collection of identical MyISAM tables                          | NO           | NO   | NO         |
| MyISAM             | YES     | MyISAM storage engine                                          | NO           | NO   | NO         |
| BLACKHOLE          | YES     | /dev/null storage engine (anything you write to it disappears) | NO           | NO   | NO         |
| CSV                | YES     | CSV storage engine                                             | NO           | NO   | NO         |
| MEMORY             | YES     | Hash based, stored in memory, useful for temporary tables      | NO           | NO   | NO         |
| ARCHIVE            | YES     | Archive storage engine                                         | NO           | NO   | NO         |
| InnoDB             | DEFAULT | Supports transactions, row-level locking, and foreign keys     | YES          | YES  | YES        |
| PERFORMANCE_SCHEMA | YES     | Performance Schema                                             | NO           | NO   | NO         |
+--------------------+---------+----------------------------------------------------------------+--------------+------+------------+
```

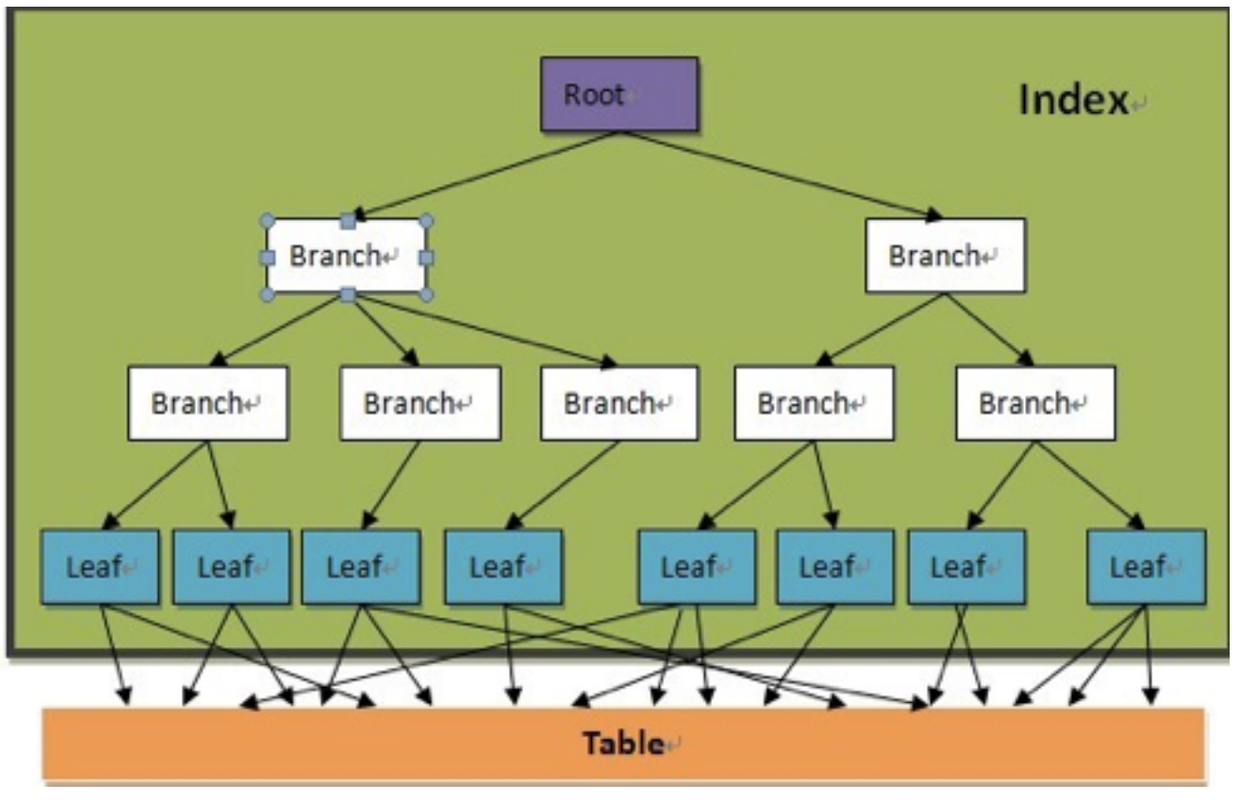
索引

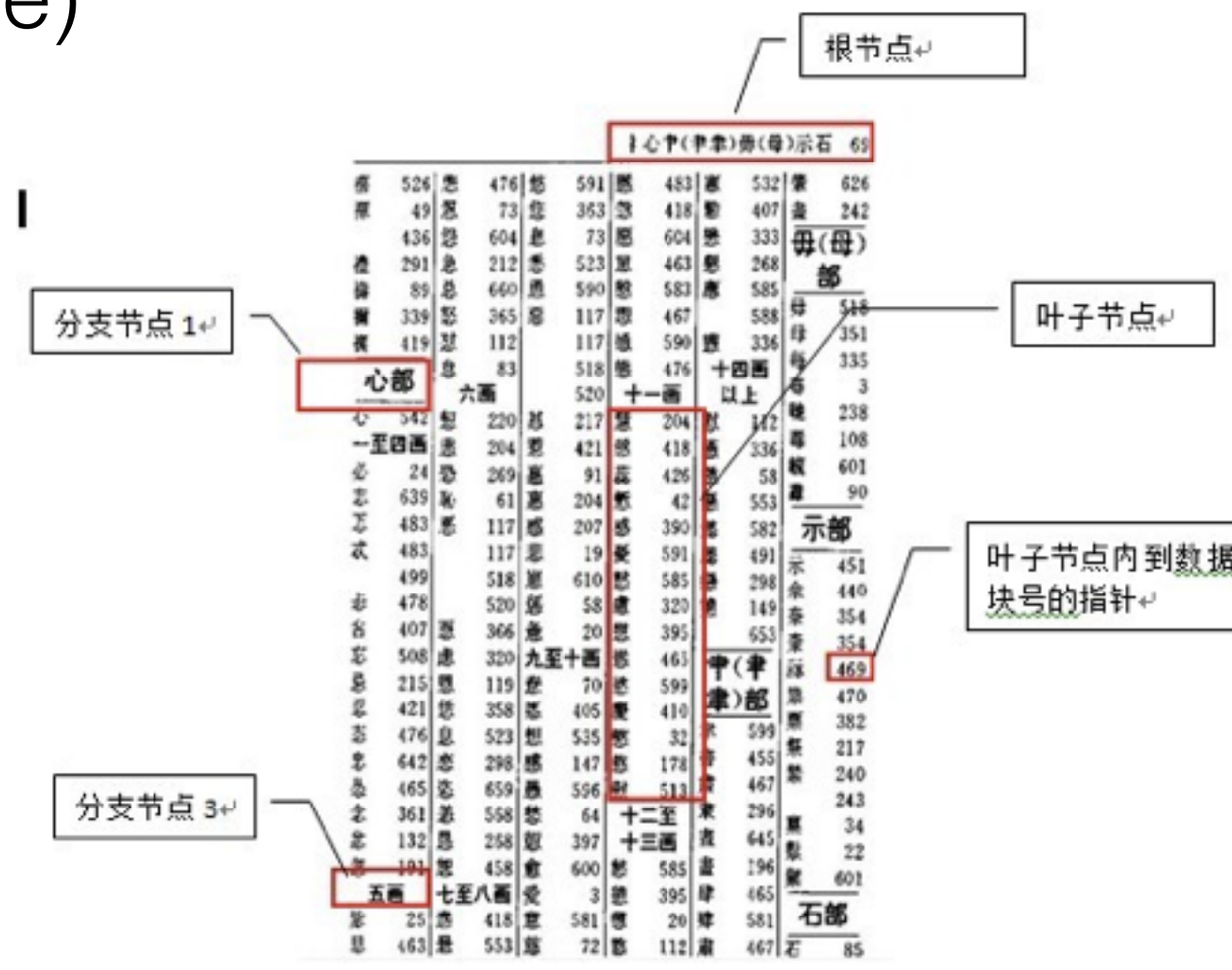
如果我们把一个表的内容认为是一本字典
那索引就相当于字典的目录

加速查找 (Select)

唯一索引 | 普通索引 | 复合索引

实现方式：B-Tree (Balance Tree)





SQL 语句

Data Definition Language　进行与数据库或表结构有关的操作

数据库

```
CREATE {DATABASE | SCHEMA} [IF NOT EXISTS] db_name
    [create_specification [, create_specification] ...]

    create_specification:
        [DEFAULT] CHARACTER SET charset_name
      | [DEFAULT] COLLATE collation_name
```

```
SHOW {DATABASES | SCHEMAS} [LIKE 'pattern']

SHOW CREATE {DATABASE | SCHEMA} db_name

USE db_name

DROP {DATABASE | SCHEMA} [IF EXISTS] db_name
```

create
show
show create
use
drop

IF EXISTS is used to prevent an error from occurring if the database does not exist.

Data Definition Language 进行与数据库或表结构有关的操作

表结构

```
CREATE [TEMPORARY] TABLE [IF NOT EXISTS] tbl_name
    [(create_definition,...)]
    [table_options] [select_statement]
```

```
create_definition:
    column_definition
  | [CONSTRAINT [symbol]] PRIMARY KEY [index_type] (index_col_name,...)
  | KEY [index_name] [index_type] (index_col_name,...)
  | INDEX [index_name] [index_type] (index_col_name,...)
  | [CONSTRAINT [symbol]] UNIQUE [INDEX]
      [index_name] [index_type] (index_col_name,...)
  | [FULLTEXT|SPATIAL] [INDEX] [index_name] (index_col_name,...)
  | [CONSTRAINT [symbol]] FOREIGN KEY
      [index_name] (index_col_name,...) [reference_definition]
  | CHECK (expr)
```

create
show
show create
desc
drop
alter

```
column_definition:
 col_name type [NOT NULL | NULL] [DEFAULT default_value]
       [AUTO_INCREMENT] [UNIQUE [KEY] | [PRIMARY] KEY]
       [COMMENT 'string'] [reference_definition]
```

```
CREATE [TEMPORARY] TABLE [IF NOT EXISTS]
      tbl_name [() LIKE old_tbl_name ()];
```

Data Definition Language　进行与数据库或表结构有关的操作

表结构

```
type:
    TINYINT[(length)] [UNSIGNED] [ZEROFILL]
  | SMALLINT[(length)] [UNSIGNED] [ZEROFILL]
  | MEDIUMINT[(length)] [UNSIGNED] [ZEROFILL]
  | INT[(length)] [UNSIGNED] [ZEROFILL]
  | INTEGER[(length)] [UNSIGNED] [ZEROFILL]
  | BIGINT[(length)] [UNSIGNED] [ZEROFILL]
  | REAL[(length,decimals)] [UNSIGNED] [ZEROFILL]
  | DOUBLE[(length,decimals)] [UNSIGNED] [ZEROFILL]
  | FLOAT[(length,decimals)] [UNSIGNED] [ZEROFILL]
  | DECIMAL(length,decimals) [UNSIGNED] [ZEROFILL]
  | NUMERIC(length,decimals) [UNSIGNED] [ZEROFILL]
  | DATE
  | TIME
  | TIMESTAMP
  | DATETIME
  | YEAR
  | CHAR(length) [BINARY | ASCII | UNICODE]
  | VARCHAR(length) [BINARY]
  | BINARY(length)
  | VARBINARY(length)
  | TINYBLOB
  | BLOB
  | MEDIUMBLOB
  | LONGBLOB
  | TINYTEXT [BINARY]
  | TEXT [BINARY]
  | MEDIUMTEXT [BINARY]
  | LONGTEXT [BINARY]
  | ENUM(value1,value2,value3,...)
  | SET(value1,value2,value3,...)
  | spatial_type
```

整形

浮点

日期

字符串

二进制

长文本

复合类型

create
show
show create
desc
drop
alter

```
table_option:
    {ENGINE|TYPE} [=] engine_name
  | AUTO_INCREMENT [=] value
  | AVG_ROW_LENGTH [=] value
  | [DEFAULT] CHARACTER SET charset_name [COLLATE collatio
  | CHECKSUM [=] {0 | 1}
  | COMMENT [=] 'string'
  | CONNECTION [=] 'connect_string'
  | MAX_ROWS [=] value
  | MIN_ROWS [=] value
  | PACK_KEYS [=] {0 | 1 | DEFAULT}
  | PASSWORD [=] 'string'
  | DELAY_KEY_WRITE [=] {0 | 1}
  | ROW_FORMAT [=] {DEFAULT|DYNAMIC|FIXED|COMPRESSED|REDUN
  | UNION [=] (tbl_name[,tbl_name]...)
  | INSERT_METHOD [=] { NO | FIRST | LAST }
  | DATA DIRECTORY [=] 'absolute path to directory'
  | INDEX DIRECTORY [=] 'absolute path to directory'
```

Data Definition Language 进行与数据库或表结构有关的操作

表结构

```
ALTER [IGNORE] TABLE tbl_name
    alter_specification [, alter_specification] ...
```

```
alter_specification:
    ADD [COLUMN] column_definition [FIRST | AFTER col_name ]
  | ADD [COLUMN] (column_definition,...)
  | ADD INDEX [index_name] [index_type] (index_col_name,...)
  | ADD [CONSTRAINT [symbol]]
        PRIMARY KEY [index_type] (index_col_name,...)
  | ADD [CONSTRAINT [symbol]]
        UNIQUE [INDEX] [index_name] [index_type] (index_col_name,...)
  | ADD [FULLTEXT|SPATIAL] [INDEX] [index_name] (index_col_name,...)
  | ADD [CONSTRAINT [symbol]]
        FOREIGN KEY [index_name] (index_col_name,...)
        [reference_definition]
  | ALTER [COLUMN] col_name {SET DEFAULT literal | DROP DEFAULT}
  | CHANGE [COLUMN] old_col_name column_definition
        [FIRST|AFTER col_name]
  | MODIFY [COLUMN] column_definition [FIRST | AFTER col_name]
  | DROP [COLUMN] col_name
  | DROP PRIMARY KEY
  | DROP INDEX index_name
  | DROP FOREIGN KEY fk_symbol
  | DISABLE KEYS
  | ENABLE KEYS
  | RENAME [TO] new_tbl_name
  | ORDER BY col_name
  | CONVERT TO CHARACTER SET charset_name [COLLATE collation_name]
  | [DEFAULT] CHARACTER SET charset_name [COLLATE collation_name]
  | DISCARD TABLESPACE
  | IMPORT TABLESPACE
  | table_options
```

create
show
show create
desc
drop
alter

Data Definition Language 进行与数据库或表结构有关的操作

表结构

```
SHOW [FULL] TABLES [FROM db_name] [LIKE 'pattern']

SHOW CREATE TABLE tbl_name

{DESCRIBE | DESC} tbl_name [col_name]
```

```
+-----------------------+---------------+------+-----+---------+-------+
| Field                 | Type          | Null | Key | Default | Extra |
+-----------------------+---------------+------+-----+---------+-------+
| Host                  | char(60)      | NO   | PRI |         |       |
| Db                    | char(64)      | NO   | PRI |         |       |
| User                  | char(16)      | NO   | PRI |         |       |
| Select_priv           | enum('N','Y') | NO   |     | N       |       |
| Insert_priv           | enum('N','Y') | NO   |     | N       |       |
| Update_priv           | enum('N','Y') | NO   |     | N       |       |
| Delete_priv           | enum('N','Y') | NO   |     | N       |       |
```

create
show
show create
desc
drop
alter

```
DROP TABLE [IF EXISTS] tbl_name [, tbl_name] ...
```

Data Definition Language　进行与数据库或表结构有关的操作

索引

区分索引与约束

```
CREATE [UNIQUE|FULLTEXT|SPATIAL] INDEX index_name
    [USING index_type]
    ON tbl_name (index_col_name,...)

index_col_name:
    col_name [(length)] [ASC | DESC]

SHOW INDEX FROM tbl_name [FROM db_name]

DROP INDEX index_name ON tbl_name
```

create
show
drop

创建(create table)数据库表时也可以增加索引

```
| [CONSTRAINT [symbol]] PRIMARY KEY [index_type]
(index_col_name,...)
| KEY [index_name] [index_type] (index_col_name,…)
| INDEX [index_name] [index_type] (index_col_name,…)
| [FULLTEXT|SPATIAL] [INDEX] [index_name]
(index_col_name,...)
```

Data Definition Language 进行与数据库或表结构有关的操作

索引 基本原则

出现在where, group, order中的字段才有必要建索引

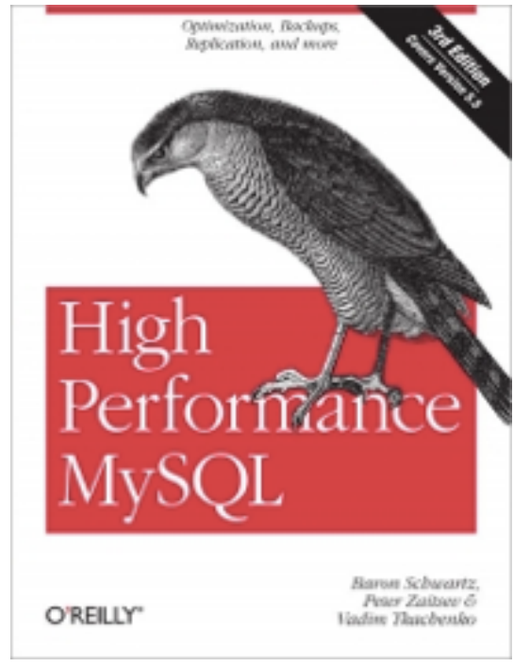
某个字段离散度越高，越适合做索引的关键字

组合索引字段顺序应与where中字段顺序相一致

对于字符串类型的列的索引，应使用前缀索引

两个表连接的字段应该建索引

占用空间小的字段使用做索引（int）



Data Manipulation Language 进行数据的增、删、改、查

```
INSERT [LOW_PRIORITY | DELAYED | HIGH_PRIORITY] [IGNORE]
    [INTO] tbl_name [(col_name,...)]
    VALUES ({expr | DEFAULT},...),(...),...
    [ ON DUPLICATE KEY UPDATE col_name=expr, ... ]

INSERT [LOW_PRIORITY | DELAYED | HIGH_PRIORITY] [IGNORE]
    [INTO] tbl_name  SET col_name={expr | DEFAULT}, ...
    [ ON DUPLICATE KEY UPDATE col_name=expr, ... ]

INSERT [LOW_PRIORITY | HIGH_PRIORITY] [IGNORE]
    [INTO] tbl_name [(col_name,…)]  SELECT ...
    [ ON DUPLICATE KEY UPDATE col_name=expr, ... ]

UPDATE [LOW_PRIORITY] [IGNORE] tbl_name
    SET col_name1=expr1 [, col_name2=expr2 ...]
    [WHERE where_condition][ORDER BY …]
    [LIMIT row_count]

DELETE [LOW_PRIORITY] [QUICK] [IGNORE]
    FROM tbl_name [WHERE where_condition]
    [ORDER BY …] [LIMIT row_count]
```

insert

update

delete

select

Data Manipulation Language 进行数据的增、删、改、查

insert

update

delete

select

单表查询

```
SELECT
    [ALL | DISTINCT | DISTINCTROW ]
      [HIGH_PRIORITY]
      [STRAIGHT_JOIN]
      [SQL_SMALL_RESULT] [SQL_BIG_RESULT] [SQL_BUFFER_RESULT]
      [SQL_CACHE | SQL_NO_CACHE] [SQL_CALC_FOUND_ROWS]
    select_expr, ...
[FROM table_references
[WHERE where_condition]
[GROUP BY {col_name | expr | position}
  [ASC | DESC], ... [WITH ROLLUP]]
[HAVING where_condition]
[ORDER BY {col_name | expr | position}
  [ASC | DESC], ...]
[LIMIT {[offset,] row_count | row_count OFFSET offset}]
[PROCEDURE procedure_name(argument_list)]
[INTO OUTFILE 'file_name' export_options
  | INTO DUMPFILE 'file_name']
[FOR UPDATE | LOCK IN SHARE MODE]]
```

Data Manipulation Language 进行数据的增、删、改、查

insert

update

delete

select

单表查询

```
SELECT
    [ALL | DISTINCT | DISTINCTROW ]
      [HIGH_PRIORITY]
      [STRAIGHT_JOIN]
      [SQL_SMALL_RESULT] [SQL_BIG_RESULT] [SQL_BUFFER_RESULT]
      [SQL_CACHE | SQL_NO_CACHE] [SQL_CALC_FOUND_ROWS]
    select_expr, ...
[FROM table_references
[WHERE where_condition]
[GROUP BY {col_name | expr | position}
  [ASC | DESC], ... [WITH ROLLUP]]
[HAVING where_condition]
[ORDER BY {col_name | expr | position}
  [ASC | DESC], ...]
[LIMIT {[offset,] row_count | row_count OFFSET offset}]
[PROCEDURE procedure_name(argument_list)]
[INTO OUTFILE 'file_name' export_options
  | INTO DUMPFILE 'file_name']
[FOR UPDATE | LOCK IN SHARE MODE]]
```

作业一

学习与MySQL相关的其他细节

PMWD Chapters 8 -10

http://wenku.baidu.com/view/1acfe579ee06eff9aef80752.html

PHP访问MySQL

面向对象
Object oriented

基于过程
Procedural

连接数据库

拼接SQL

进行查询

获取结果

释放空间

关闭连接

```php
<?php
$link = mysqli_connect('localhost', 'root', 'root' , 'php_course');
if(!$link) die('Connect Error: '.mysqli_connect_error());

$sql = "SELECT * FROM user";

$result = mysqli_query( $link, $sql);
if(!$result) die('Query Error: '.$SQL);

$num_of_rows = mysqli_num_rows($result);
echo "<table border='1'>";
while($row = mysqli_fetch_array($result, MYSQLI_ASSOC)) {
    echo "<tr>\n";
    foreach ($row as $no => $value) {
        echo "<td>".$value."</td>\n";
    }
    echo "</tr>\n";
}
echo "</table>";

mysqli_free_result($result);
mysqli_close($link);
?>
```

基于过程

Procedural

为什么要面向对象

```php
<?php
$link = mysqli_connect('localhost', 'root', 'root' , 'php_course');
if(!$link) die('Connect Error: '.mysqli_connect_error());

$sql = "SELECT * FROM user";

$result = mysqli_query( $link, $sql);
if(!$result) die('Query Error: '.$SQL);

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while($row = mysqli_fetch_array($result, MYSQLI_ASSOC)) {
    echo "<tr>\n";
    foreach ($row as $no => $value) {
        echo "<td>".$value."</td>\n";
    }
    echo "</tr>\n";
}
echo "</table>";

mysqli_free_result($result);
mysqli_close($link);
?>
```

连接数据库

拼接SQL

进行查询

获取结果

释放空间

关闭连接

```php
<?php
$link = new mysqli('localhost', 'root', 'root', 'php_course');
if($link->connect_errno) {
    die("Connection Failed: ". $link->connection_error);
}

$sql = "SELECT * FROM user";

if($result = $link->query($sql)) {
    echo "<table border='1'>";
    while ($row = $result->fetch_assoc()) {
        echo "<tr>";
        echo "<td>{$row['id']}</td>";
        echo "<td>{$row['name']}</td>";
        echo "<td>{$row['age']}</td>";
        echo "<td>{$row['class']}</td>";
        echo "</tr>";
        echo "</tr>";
    }
    echo "</table>";
    $result->free();
}

$link->close();
?>
```

面向对象

Object oriented

作业二

学习PHP访问MySQL的细节

PMWD Chapters 11

http://php.net/manual/en/book.mysqli.php

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