

A.

Field	Type	Null	Key	Default	Extra
champion_name	varchar(15)	NO		NULL	
champion_id	int(11)	NO	PRI	NULL	

2 rows in set (0.00 sec)

Field	Type	Null	Key	Default	Extra
match_id	int(11)	NO	PRI	NULL	
duration	int(11)	NO		NULL	
version	varchar(15)	NO		NULL	

3 rows in set (0.00 sec)

Field	Type	Null	Key	Default	Extra
player_id	int(11)	NO	PRI	NULL	
match_id	int(11)	NO	MUL	NULL	
player	tinyint(4)	YES		NULL	
champion_id	int(11)	NO		NULL	
ss1	varchar(15)	YES		NULL	
ss2	varchar(15)	YES		NULL	
position	varchar(15)	NO		NULL	

7 rows in set (0.00 sec)

Field	Type	Null	Key	Default	Extra
player_id	int(11)	NO	PRI	NULL	
win	tinyint(1)	YES		NULL	
item1	smallint(6)	YES		NULL	
item2	smallint(6)	YES		NULL	
item3	smallint(6)	YES		NULL	
item4	smallint(6)	YES		NULL	
item5	smallint(6)	YES		NULL	
item6	smallint(6)	YES		NULL	
kills	tinyint(4)	YES		NULL	
deaths	tinyint(4)	YES		NULL	
assists	tinyint(4)	YES		NULL	
longesttimespentliving	smallint(6)	YES		NULL	
doublekills	tinyint(4)	YES		NULL	
triplekills	tinyint(4)	YES		NULL	
quadarkills	tinyint(4)	YES		NULL	
pentakills	tinyint(4)	YES		NULL	
legendarykills	tinyint(4)	YES		NULL	
goldearned	mediumint(9)	YES		NULL	
firstblood	tinyint(1)	YES		NULL	

19 rows in set (0.00 sec)

Field	Type	Null	Key	Default	Extra
match_id	int(11)	NO	PRI	NULL	
team	char(1)	NO		NULL	
champion_id	int(11)	NO		NULL	
banturn	tinyint(4)	NO	PRI	NULL	

4 rows in set (0.00 sec)

1. char 與 varchar 的空間大小以後面的數字但 char 是固定長度，長度不足會補空白在右邊且計算時間少，而 varchar 則是動態分配，不固定長度，須要較多的計算時間

2. tinyint(1), 0 為假 1 為真
3. 1 byte for 'tinyint', 2 bytes for 'smallint', 3 bytes for 'mediumint', 4 bytes for 'int'
4. 讓 champion_id 可以放在每個 table, 因為這次的作業用到很多

champion_id, 這樣比較方便

C.

1.

```
SELECT COUNT(*) as cnt
FROM champ;
```

```
+-----+
| cnt |
+-----+
| 138 |
+-----+
1 row in set (0.00 sec)
```

2.

```
SELECT COUNT(DISTINCT SUBSTRING_INDEX(version, ".", 2)) as cnt
FROM match_info;
```

```
+-----+
| cnt |
+-----+
| 74 |
+-----+
1 row in set (0.18 sec)
```

3.

```
select Ch.champion_name as champion_name, COUNT(Ch.champion_id) as cnt
from participant P, champ Ch
where Ch.champion_id = P.champion_id and P.position = 'JUNGLE'
group by champion_name
order by cnt DESC limit 3;
```

```
+-----+-----+
| champion_name | cnt |
+-----+-----+
| Lee Sin       | 56598 |
| Master Yi     | 23385 |
| Graves        | 19767 |
+-----+-----+
3 rows in set (2.09 sec)
```

4.

```
select t1.win as win_num, t2.cnt as total_num, t1.win/t2.cnt as win_ratio
from (select count(distinct p1.match_id) as win
      from stat s, participant p1
      where s.firstblood = 1 and s.win = 1 and s.player_id = p1.player_id) as t1,
      (select count(m.match_id) as cnt from match_info m) as t2;
```

```
select count(distinct p.player_id) as win, p.position as position
from stat s, participant p
where s.firstblood = 1 and s.win = 1 and s.player_id = p.player_id
group by p.position
order by win DESC;SS|
```

match_id	time
146486	01:23:11
69303	01:20:14
581	01:16:59
70361	01:15:06
176628	01:13:34

5 rows in set (0.20 sec)

5.

```
select 'lose' as win_lose, count(temp.l) as cnt
from (select p.match_id as match_id, AVG(s.longesttimespentliving) as l
      from participant p, stat s
      where p.player_id = s.player_id and s.win = 0
      group by match_id
      having l >= 1200) as temp

union

select 'win' as win_lose, count(temp.l) as cnt
from (select p.match_id as match_id, AVG(s.longesttimespentliving) as l
      from participant p, stat s
      where p.player_id = s.player_id and s.win = 1
      group by match_id
      having l >= 1200) as temp;
```

win_lose	cnt
lose	338
win	807

2 rows in set (21.37 sec)

6.

```
select 'DUO_CARRY' as position, ch.champion_name as champion_name
from champ ch, (select p.champion_id as id, count(ch.champion_name) as cnt
               from participant p, champ ch, match_info m
               where m.match_id = p.match_id and p.champion_id = ch.champion_id and p.position = 'DUO_CARRY' and duration between 2400 and 3000
               group by p.champion_id
               order by cnt DESC limit 1
               ) as temp
where ch.champion_id = temp.id
union
select 'DUO_SUPPORT' as position, ch.champion_name as champion_name
from champ ch, (select p.champion_id as id, count(ch.champion_name) as cnt
               from participant p, champ ch, match_info m
               where m.match_id = p.match_id and p.champion_id = ch.champion_id and p.position = 'DUO_SUPPORT' and duration between 2400 and 3000
               group by p.champion_id
               order by cnt DESC limit 1
               ) as temp
where ch.champion_id = temp.id
union
select 'JUNGLE' as position, ch.champion_name as champion_name
from champ ch, (select p.champion_id as id, count(ch.champion_name) as cnt
               from participant p, champ ch, match_info m
               where m.match_id = p.match_id and p.champion_id = ch.champion_id and p.position = 'JUNGLE' and duration between 2400 and 3000
               group by p.champion_id
               order by cnt DESC limit 1
               ) as temp
where ch.champion_id = temp.id
union
select 'MID' as position, ch.champion_name as champion_name
from champ ch, (select p.champion_id as id, count(ch.champion_name) as cnt
               from participant p, champ ch, match_info m
               where m.match_id = p.match_id and p.champion_id = ch.champion_id and p.position = 'MID' and duration between 2400 and 3000
               group by p.champion_id
               order by cnt DESC limit 1
               ) as temp
where ch.champion_id = temp.id
union
select 'TOP' as position, ch.champion_name as champion_name
from champ ch, (select p.champion_id as id, count(ch.champion_name) as cnt
               from participant p, champ ch, match_info m
               where m.match_id = p.match_id and p.champion_id = ch.champion_id and p.position = 'TOP' and duration between 2400 and 3000
               group by p.champion_id
               order by cnt DESC limit 1
               ) as temp
where ch.champion_id = temp.id;
```

position	champion_name
DUO_CARRY	Caitlyn
DUO_SUPPORT	Thresh
JUNGLE	Lee Sin
MID	Ahri
TOP	Riven

7.

```
select 'DUO_CARRY' as position ,ch.champion_name as name, temp.kda as kda
from champ ch, (select ch.champion_id as id, (sum(s.assists)+sum(s.kills))/sum(s.deaths) as kda
from stat s,participant p, champ ch
where p.position = 'DUO_CARRY' and s.player_id = p.player_id and p.champion_id = ch.champion_id
group by p.champion_id
order by kda DESC limit 1) as temp
where ch.champion_id = temp.id
union
select 'DUO_SUPPORT' as position ,ch.champion_name as name, temp.kda as kda
from champ ch, (select ch.champion_id as id, (sum(s.assists)+sum(s.kills))/sum(s.deaths) as kda
from stat s,participant p, champ ch
where p.position = 'DUO_SUPPORT' and s.player_id = p.player_id and p.champion_id = ch.champion_id
group by p.champion_id
order by kda DESC limit 1) as temp
where ch.champion_id = temp.id
union
select 'JUNGLE' as position ,ch.champion_name as name, temp.kda as kda
from champ ch, (select ch.champion_id as id, (sum(s.assists)+sum(s.kills))/sum(s.deaths) as kda
from stat s,participant p, champ ch
where p.position = 'JUNGLE' and s.player_id = p.player_id and p.champion_id = ch.champion_id
group by p.champion_id
order by kda DESC limit 1) as temp
where ch.champion_id = temp.id
union
select 'MID' as position ,ch.champion_name as name, temp.kda as kda
from champ ch, (select ch.champion_id as id, (sum(s.assists)+sum(s.kills))/sum(s.deaths) as kda
from stat s,participant p, champ ch
where p.position = 'MID' and s.player_id = p.player_id and p.champion_id = ch.champion_id
group by p.champion_id
order by kda DESC limit 1) as temp
where ch.champion_id = temp.id
union
select 'TOP' as position ,ch.champion_name as name, temp.kda as kda
from champ ch, (select ch.champion_id as id, (sum(s.assists)+sum(s.kills))/sum(s.deaths) as kda
from stat s,participant p, champ ch
where p.position = 'TOP' and s.player_id = p.player_id and p.champion_id = ch.champion_id
group by p.champion_id
order by kda DESC limit 1) as temp
where ch.champion_id = temp.id;
```

```
+-----+-----+-----+
| position | name | kda |
+-----+-----+-----+
| DUO_CARRY | Shaco | 19.0000 |
| DUO_SUPPORT | Janna | 3.8330 |
| JUNGLE | Ivern | 3.8764 |
| MID | Ivern | 3.7015 |
| TOP | Sona | 3.1538 |
+-----+-----+-----+
5 rows in set (1 min 0.98 sec)
```

8.

```
select ch.champion_name as champion_name
from champ ch
where ch.champion_id NOT IN (select distinct ban.champion_id from teamban ban where ban.match_id IN (select distinct n.match_id from match_info n where n.version like '7.7.X'))
order by champion_name ASC;
```

```
+-----+
| champion_name |
+-----+
| Kayn |
| Ornn |
| Rakan |
| RekSai |
| Sion |
| Xayah |
+-----+
6 rows in set (0.16 sec)
```

9.

```
select temp.v as version, sum(temp.win) as win_cnt, count(temp.win)-sum(temp.win) as lose_cnt, sum(temp.win)/(sum(temp.win)+count(temp.win)-sum(temp.win)) as win_ratio
from (select distinct p1.player_id, s.win as win, p.match_id, SUBSTRING_INDEX(m.version, '.', 2) as v
from participant p1, participant p2, participant p, match_info m, stat s
where p1.champion_id = 17 and p2.champion_id = 64 and p1.player div 6 = p2.player div 6
and p.match_id = p1.match_id and p.match_id = p2.match_id and m.match_id = p.match_id
and p1.player_id = s.player_id
order by v) as temp
group by temp.v
order by temp.v;
```


version	win_cnt	lose_cnt	win_ratio
4.10	2	1	0.6667
4.12	0	1	0.0000
4.15	1	1	0.5000
4.17	0	1	0.0000
4.18	0	1	0.0000
4.19	0	1	0.0000
4.21	1	1	0.5000
4.9	1	0	1.0000
5.1	1	2	0.3333
5.12	1	0	1.0000
5.13	0	1	0.0000
5.15	0	1	0.0000
5.19	1	0	1.0000
5.20	2	0	1.0000
5.21	0	2	0.0000
5.24	1	1	0.5000
5.5	1	0	1.0000
5.6	0	1	0.0000
5.7	1	0	1.0000
6.1	0	1	0.0000
6.13	1	0	1.0000
6.14	1	0	1.0000
6.18	1	1	0.5000
6.19	1	0	1.0000
6.2	1	1	0.5000
6.20	3	2	0.6000
6.21	0	2	0.0000
6.22	2	1	0.6667
6.23	3	2	0.6000
6.24	4	3	0.5714
6.5	1	0	1.0000
6.6	0	1	0.0000
6.8	1	0	1.0000
6.9	1	1	0.5000
7.10	282	304	0.4812
7.2	2	1	0.6667
7.3	0	1	0.0000
7.4	1	1	0.5000
7.5	2	2	0.5000
7.6	2	5	0.2857
7.7	32	29	0.5246
7.8	210	237	0.4698
7.9	527	464	0.5318

43 rows in set (8.10 sec)

10.

```
select temp2.name as self_champion_name, temp2.c_win_ratio as win_ratio, temp2.c_kda as self_kda, temp2.c_avg_gold as self_avg_gold, ch.champion_name as enemy_champ_name, temp2.r_kda as enemy_kda,
temp2.r_avg_gold as enemy_avg_gold, temp2.num as battle_record
from champ ch, (select temp.champion as name, count(temp.champion) as num, sum(temp.c_win)/count(temp.c_win) as c_win_ratio, (sum(temp.c_assist)+sum(temp.c_kill))/sum(temp.c_death) as c_kda,
(sum(temp.r_assist)+sum(temp.r_kill))/sum(temp.r_death) as r_kda, avg(temp.r_earned) as r_avg_gold, avg(temp.c_earned) as c_avg_gold
from (select distinct ch.champion_name as champion, s2.win as c_win, s1.deaths as r_death, s1.kills as r_kill, s1.assists as r_assist, s2.deaths as c_death, s2.kills as c_kill, s2.assists as c_assist,
s1.gold_earned as r_earned, s2.gold_earned as c_earned
from participant p1, participant p2, participant p, stat s1, stat s2, champ ch
where p1.champion_id = s8 and p1.position = 'top' and p2.position = 'top' and p1.player_id = s1 and p2.player_id = s2 and p.match_id = p1.match_id and p.match_id = p2.match_id and p1.player_id = s1.player_id
and p2.player_id = s2.player_id and ch.champion_id = p2.champion_id ) as temp
group by temp.champion
having sum(temp.c_death) > 0 ) as temp2
where ch.champion_id = s8 and temp2.num > 100
order by win_ratio desc limit 5;
```

self_champion_name	win_ratio	self_kda	self_avg_gold	enemy_champ_name	enemy_kda	enemy_avg_gold	battle_record
Teemo	0.5756	1.9377	12429.4756	Renekton	1.8590	11838.0422	450
Pantheon	0.5433	2.3578	11710.6325	Renekton	1.6877	11377.3648	381
Nautilus	0.5399	2.5245	10610.6304	Renekton	2.0992	12158.3877	276
Jax	0.5336	1.8333	11920.0637	Renekton	1.9874	11737.3632	581
Jarvan IV	0.5333	2.5204	10889.9185	Renekton	1.9347	11220.7037	135

5 rows in set (10.08 sec)

11.

```
select sum(temp.FI) as win_num_of_FI, sum(temp.FT) as win_num_of_FT
from (select si.win as FI, s2.win as FT
from participant p1, participant p2, stat s1, stat s2
where p1.position = 'TOP' and p2.position = 'TOP' and ((p1.ss1 = 'Flash' and p1.ss2 = 'Ignite') or p1.ss1 = 'Ignite' and p1.ss2 = 'Flash') and ((p2.ss1 = 'Flash' and p2.ss2 = 'Teleport') or p2.ss1 = 'Teleport' and p2.ss2 = 'Flash') and p1.player_id = s1.player_id and p2.player_id = s2.player_id
and p1.match_id = p2.match_id and p1.player div 6 < p2.player div 6) as temp;
```

win_num_of_FI	win_num_of_FT
17044	15684

1 row in set (17.04 sec)

當 position 為 TOP 時，找出帶有召喚師技能閃現+點燃的玩家 1 及閃現+傳送的玩家 2，兩位玩家必須在同一場次但是不同隊，之後分別算出玩家 1 的隊伍贏了幾場及玩家 2 的隊伍贏了幾場。由結果發現有召喚師技能閃現+點燃的隊伍獲勝的場次較多，因此獲勝機會較大。

12.

```
select t1.win as win_num, t2.cnt as total_num, t1.win/t2.cnt as win_ratio
from (select count(distinct p1.match_id) as win
from stat s, participant p1
where s.firstblood = 1 and s.win = 1 and s.player_id = p1.player_id) as t1,
(select count(m.match_id) as cnt from match_info m) as t2;
```

win_num	total_num	win_ratio
107388	182527	0.5883

1 row in set (4.55 sec)

```
select t1.win as win_num, t2.cnt as total_num, t1.win/t2.cnt as win_ratio, p.position as position
from participant p, (select count(distinct p.player_id) as win, p.position as pos1
from stat s, participant p
where s.firstblood = 1 and s.win = 1 and s.player_id = p.player_id
group by p.position) as t1, (select count(p1.match_id) as cnt, p1.position as pos2
from participant p1
group by p1.position) as t2
where p.position = t2.pos2 and p.position = t1.pos1
group by p.position
order by win_ratio DESC;
```

win_num	total_num	win_ratio	position
27192	362944	0.0749	TOP
27115	369032	0.0735	JUNGLE
22467	367933	0.0611	MID
19668	334070	0.0589	DUO_CARRY
116	2753	0.0421	NONE
2043	49594	0.0412	DUO
8675	334070	0.0260	DUO_SUPPORT
112	4874	0.0230	SOLO

第一個 query 是計算在一場比賽中獲得首殺的隊伍的獲勝次數及勝率因為打遊戲的時候最在乎的應該是勝率吧，由資料發現獲得首殺的隊伍贏的比率大概是 0.58，所以好像也沒有獲得首殺就比較容易贏的樣子。

第二個 query 是計算在各個 position 中獲得首殺的隊伍的獲勝次數及勝率由資料發現在 position 在'TOP'時獲得首殺的隊伍贏的比率最大。