

**TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI**

**BỘ MÔN: CƠ SỞ DỮ LIỆU**

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**BÁO CÁO THỰC HÀNH CƠ SỞ DỮ LIỆU**

**ĐỀ TÀI: Xây dựng cơ sở dữ liệu thống kê  
chỉ số trong các mùa giải NBA.**

**Giảng viên hướng dẫn : TS.Trần Việt Trung**

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# **I. Giới thiệu bài toán**

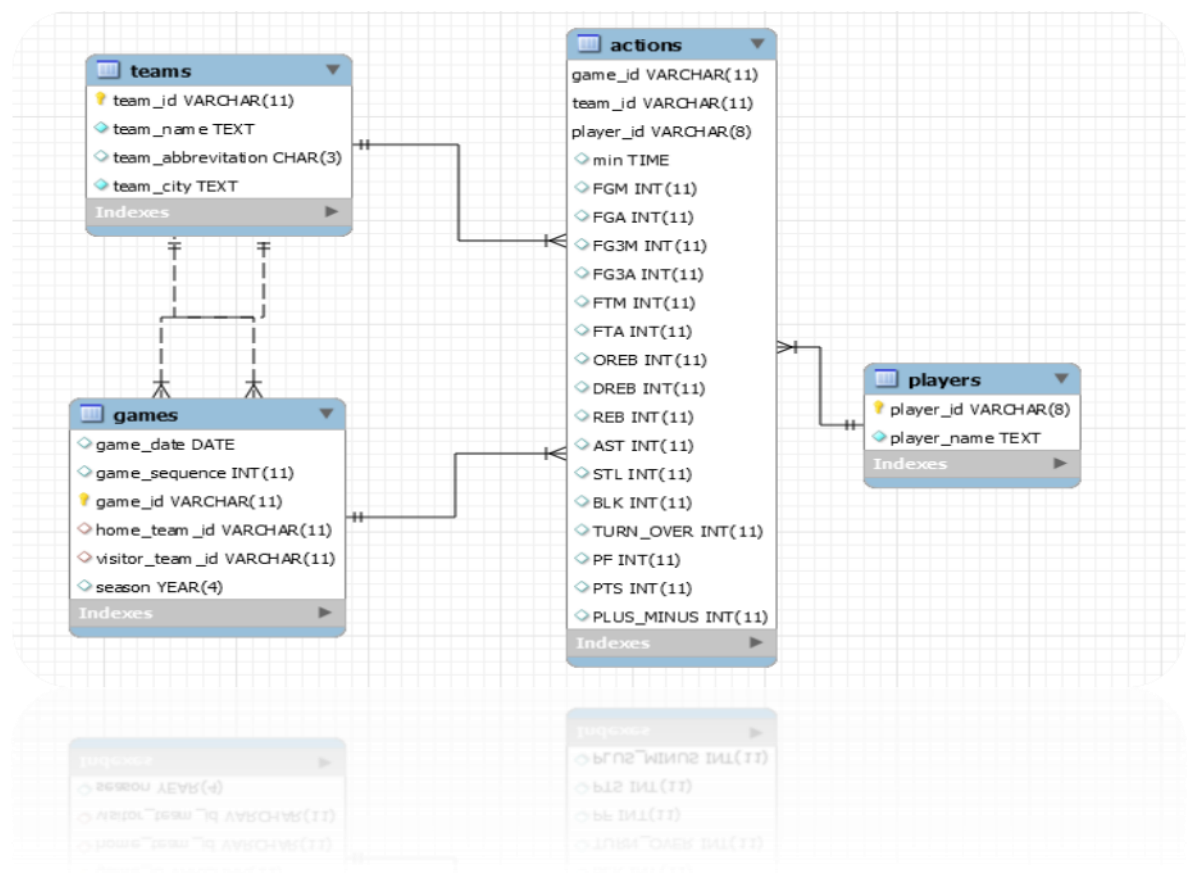
## **1. Ứng dụng của hệ CSDL**

- ◆ Quản lý danh sách các cầu thủ
- ◆ Quản lý danh sách các đội
- ◆ Quản lý danh sách các trận đấu
- ◆ Quản lý các chỉ số có trong mỗi trận đấu

## **2. Các yêu cầu về dữ liệu cần lưu trữ**

- ◆ Dữ liệu về cầu thủ : id của cầu thủ và tên
- ◆ Dữ liệu về đội: team id, tên đội, tên viết tắt, thành phố
- ◆ Dữ liệu về trận đấu: ngày thi đấu, thứ tự thi đấu trong ngày, game id, mùa,...
- ◆ Dữ liệu chỉ số: team id, player id , game id, số phút thi đấu, các chỉ số như steal, block,...

## **3. Sơ đồ thực thể liên kết**



### **3.1 Bảng Teams**

- ◆ Team\_id là khóa chính
- ◆ Team\_name là tên đội
- ◆ Team\_abbreviation là tên viết tắt của đội
- ◆ Team\_city là tên thành phố của đội

### **3.2 Bảng Games**

- ◆ Game\_date là ngày thi đấu
- ◆ Game\_sequence là thứ tự thi đấu
- ◆ Game\_id là khóa chính
- ◆ Home\_team\_id, visitor\_team\_id là khóa ngoại tham chiếu đến team\_id của bảng Teams
- ◆ Season là mùa giải

### **3.3 Bảng Actions**

- ◆ Game\_id là khóa ngoại tham chiếu đến game\_id của bảng Games
- ◆ Team\_id là khóa ngoại tham chiếu đến team\_id của bảng Teams
- ◆ Player\_id khóa ngoại tham chiếu đến player\_id của bảng Players
- ◆ Min,FGM,FTA,REB,BLK ... là các chỉ số của 1 player trong 1 trận đấu

### **3.4 Bảng Player**

- ◆ Player\_id là khóa chính
- ◆ Player\_name là tên của VĐV

## II. Các câu truy vấn

### 1. Đưa ra các trận đấu trong ngày x-y-z

```
select game_date as Date, h.team_name as "Home", v.team_name as Visitor
  from games as g
 join teams as h on g.home_team_id=h.team_id
 join teams as v on g.visitor_team_id = v.team_id
 where g.game_date = "2012-10-30";
```

Date	Home	Visitor
2012-10-30	Cavaliers	Wizards
2012-10-30	Heat	Celtics
2012-10-30	Lakers	Mavericks

### 2. Đưa ra tổng số trận đội a trong mùa x

```
select count(game_id) from games
  where (home_team_id in
        (select team_id as t from teams where team_name = "Celtics")
 or visitor_team_id in
        (select team_id as t from teams where team_name = "Celtics"))
 and season = 2018;
```

count(game_id)
82

### 3. Đưa ra trung bình điểm mỗi trận của mỗi đội mùa x

```
select team_name, TrungBinh from
  (select sum(PTS)/count(distinct(a.game_id)) as TrungBinh,
   a.team_id as id from actions as a
  join games as g on a.game_id = g.game_id
   where g.season = 2018 group by team_id) as x
 join teams as t on x.id = t.team_id;
```

team_name	TrungBinh
Hawks	113.3415
Celtics	112.3902
Cavaliers	104.4756
Hornets	115.4390
Bulls	104.9390
Mavericks	108.8659
Nuggets	110.6707

**4. Đưa ra top 10 đội tỉ lệ số điểm ghi được bằng ném 3 nhiều nhất mùa x**

```

select team_name, TrungBinh from
  (select sum(FG3M)*3/sum(PTS) as TrungBinh, a.team_id as id
   from actions as a
  join games as g
   on a.game_id = g.game_id
  where g.season = 2018 group by team_id) as x
join teams as t on x.id = t.team_id order by TrungBinh desc limit 10;

```

team_name	TrungBinh
Rockets	0.4249
Hawks	0.3444
Mavericks	0.3435
Bucks	0.3422
Nets	0.3413
Pistons	0.3394
Warriors	0.3379

**5.Đưa ra cầu thủ ghi trung bình điểm mỗi trận cao nhất mùa x**

```
select player_name, TrungBinh from
(select sum(PTS)/count(distinct(a.game_id)) as TrungBinh,
a.player_id as id
from actions as a join games as g
on a.game_id = g.game_id
where g.season = 2018 group by a.player_id) as x
join players as p on x.id = p.player_id order by TrungBinh desc limit 1;
```

player_name	TrungBinh
James Harden	36.1282

**6.Đưa ra top 10 cầu thủ có tỉ lệ ném ba tốt nhất mùa x (ném ít nhất 20 quả)**

```
select player_name, TrungBinh from
(select sum(FG3M)/sum(FG3A) as TrungBinh, a.player_id as id
from actions as a
join players as p on a.player_id = p.player_id
join games as g on a.game_id = g.game_id
where g.season = 2018 group by a.player_id
having sum(FG3A) > 20) as x
join players as p on x.id = p.player_id order by TrungBinh desc limit 10;
```

player_name	TrungBinh
Alex Caruso	0.4800
Malcolm Miller	0.4762
Joe Harris	0.4741
Kadeem Allen	0.4722
Dante Cunningham	0.4615
Danny Green	0.4552
Meyers Leonard	0.4505
Seth Curry	0.4502
Henry Ellenson	0.4474
Stephen Curry	0.4370

## 7.Đưa ra top 10 cầu thủ có nhiều Triple Double nhất mùa x

```
drop function if exists TripleDouble;
DELIMITER $$
CREATE FUNCTION TripleDouble(
    REB int,
    AST int,
    STL int,
    BLK int,
    PTS int )
RETURNS int
DETERMINISTIC
BEGIN
    DECLARE result int;
    SET result = 0;
    IF REB > 9 THEN
        SET result = result +1;
    END IF;
    IF AST > 9 THEN
        SET result = result +1;
    END IF;
    IF BLK > 9 THEN
        SET result = result +1;
    END IF;
    IF STL > 9 THEN
        SET result = result +1;
    END IF;
    IF PTS > 9 THEN
        SET result = result +1;
    END IF;
    RETURN (result);
END$$
DELIMITER ;
```

```

select player_name, TB from
(select
count(if(TripleDouble(a.REB,a.AST,a.BLK,a.STL,a.PTS)>2,3,NULL))
as TB, a.player_id as id
from actions as a join players as p on a.player_id = p.player_id
join games as g on a.game_id = g.game_id
where g.season = 2018 group by a.player_id) as x
join players as p on x.id = p.player_id order by TB desc limit 10;

```

player_name,	TB
Russell Westbrook	34
Nikola Jokic	12
Ben Simmons	10
Luka Doncic	8
LeBron James	8
James Harden	7
Elfrid Payton	6
Giannis Antetokounmpo	5
Delon Wright	3
Joel Embiid	2

### 8.Đưa ra top 10 đội bóng có tỉ lệ FG(FGM/FGA) nhất mùa x

```

select team_name, TrungBinh from
(select sum(FGM)/sum(FGA) as TrungBinh, a.team_id as id
from actions as a
join games as g on a.game_id = g.game_id
where g.season = 2018 group by team_id) as x
join teams as t on x.id = t.team_id order by TrungBinh desc limit 10;

```

team_name	TrungBinh
Warriors	0.4907
Spurs	0.4785
Bucks	0.4758
Pacers	0.4751
Raptors	0.4736
Hornets	0.4735
Clippers	0.4714
76ers	0.4710



**9) Đưa ra top 10 đội bóng có hàng phòng ngự tốt nhất mùa x (Đội bị ghi ít điểm nhất)**

with

```
temp as (select a.team_id, a.game_id, sum(PTS) as points
        from actions as a
        join games as g on a.game_id = g.game_id
        where season = 2018 group by team_id, game_id),
```

temp2 as

```
(select t1.team_id as team_id, t1.game_id as game_id, t2.points as Lpoints
    from temp as t1 join temp as t2
    on (t1.game_id = t2.game_id and t1.team_id != t2.team_id))
```

```
select concat(team_city, ' ', team_name) as Team, Lpoints/82 as "PPG Allow"
    from (select team_id, sum(Lpoints) as Lpoints
        from temp2 group by team_id order by sum(Lpoints) limit 10) as t join
teams as te on t.team_id = te.team_id;
```

Team	PPG Allow
Indiana Pacers	104.6829
Miami Heat	105.9390
Memphis Grizzlies	106.1341
Utah Jazz	106.4634
Orlando Magic	106.6098
Denver Nuggets	106.7195
Detroit Pistons	107.2927

## 10,Đưa ra thống kê đối đầu giữa 2 đội trong mùa x

```
drop procedure if exists TwoTem;
DELIMITER //
CREATE PROCEDURE TwoTem(IN team1name VARCHAR(60), in
team2name varchar(60), in inputseason year)
BEGIN
    declare team1id, team2id varchar(11);
    select team_id from teams where team_name = team1name into team1id;
    select team_id from teams where team_name = team2name into team2id;
    with temp as (select game_id from games
        where (((home_team_id=team1id and visitor_team_id=team2id)
        or (home_team_id=team2id and visitor_team_id=team1id))
        and season = inputseason)),
    temp2 as (select a.game_id, sum(PTS) as t1PTS from actions as a
        join temp as t on a.game_id = t.game_id
        where a.team_id = team1id
        group by game_id, team_id),
    temp3 as (select a.game_id, sum(PTS) as t2PTS from actions as a
        join temp as t on a.game_id = t.game_id
        where a.team_id = team2id
        group by game_id, team_id),
    temp4 as (select temp2.game_id, t1PTS, t2PTS from temp2
        join temp3 on temp2.game_id = temp3.game_id)
    select concat(team1name,'-',team2name) as teams,
        concat(count(if(t1PTS>t2PTS,1,NULL)),'-',
        count(if(t2PTS>t1PTS,1,NULL)))
        as result from temp4;
END //
DELIMITER ;
call TwoTem("Celtics","Hawks",2018);
```

teams	result
Celtics-Hawks	4-0

## 11.Đưa ra kết quả của một đội trong mùa x->y

```
drop procedure if exists OneTem;
DELIMITER //
CREATE PROCEDURE OneTem(IN teamname VARCHAR(60), in
startseason year, in endseason year)
BEGIN
    declare teamid varchar(11);
    select team_id from teams
        where team_name = teamname into teamid;
    with
        temp as (select game_id from games
            where (((home_team_id=teamid)or(visitor_team_id=teamid))
                and season <= endseason and season>=startseason)),
        temp2 as (select a.game_id, sum(PTS) as t1PTS from actions as a
            join temp as t on a.game_id = t.game_id
            where a.team_id = teamid group by game_id, team_id),

        temp3 as (select a.game_id, sum(PTS) as t2PTS from actions as a
            join temp as t on a.game_id = t.game_id
            where a.team_id != teamid group by game_id, team_id),

        temp4 as (select temp2.game_id, t1PTS, t2PTS from temp2
            join temp3
            on temp2.game_id = temp3.game_id)
    select teamname as team,
        concat(count(if(t1PTS>t2PTS,1,NULL)),'-',
            count(if(t2PTS>t1PTS,1,NULL)))
        as result from temp4;
END //
DELIMITER ;
call OneTem("Celtics",2013,2018);
```

team	result
Celtics	217-193

## 12.Đưa ra top 10 đội bóng có thành tích tốt nhất mùa x

with

```
temp as (select a.team_id, a.game_id, sum(PTS) as PTS
from actions as a
join games as g on a.game_id = g.game_id
where season=2018
group by a.game_id, a.team_id),
```

```
temp2 as (select g.game_id, t1.team_id as hid,t1.PTS as hpoints,
               t2.team_id as vid, t2.PTS as vpoints
from (games as g join temp as t1
      on g.game_id = t1.game_id and g.home_team_id = t1.team_id)
join temp as t2
on g.game_id = t2.game_id and g.visitor_team_id = t2.team_id),
```

```
temp3 as (select hid, count(if(hpoints>vpoints,1,NULL)) as hwin,
               count(if(hpoints<vpoints,1,NULL)) as hlose
from temp2 group by hid),
```

```
temp4 as (select vid,
               count(if(vpoints>hpoints,1,NULL)) as vwin,
               count(if(vpoints<hpoints,1,NULL)) as vlose
from temp2 group by vid)
select team_name, hwin+vwin as wins, hlose+vlose as lose
from temp3 join temp4 on hid = vid
join teams on hid = team_id order by wins-lose desc limit 10;
```

team_name	wins	lose
Bucks	60	22
Raptors	58	24
Warriors	57	25
Nuggets	54	28
Rockets	53	29

**13) Đưa ra top 10 cầu thủ có điểm đánh giá với công thức gamescore trung bình trong mùa x tốt nhất**

```
drop function if exists gamescore;
DELIMITER $$
CREATE FUNCTION gamescore(
    FGM int,
    FGA int,
    FG3M int,
    FG3A int,
    FTM int,
    FTA int,
    OREB int,
    DREB int,
    AST int,
    STL int,
    BLK int,
    TURN_OVER int,
    PF int,
    PTS int )
RETURNS int
DETERMINISTIC
BEGIN
    DECLARE result int;
    SET result = PTS + (0.4 * FGM) - (0.7 * FGA) - (0.4 * (FTA - FTM))
+ (0.7 * OREB) + (0.3 * DREB) + STL + (0.7 * AST) + (0.7 * BLK) - (0.4 *
PF) - TURN_OVER;
    RETURN (result);
END$$
DELIMITER ;
select player_name, TrungBinh from
    (select
avg(gamescore(FGM,FGA,FG3M,FG3A,FTM,FTA,OREB,DREB,AST,STL,BLK,
TURN_OVER,PF,PTS)) as TrungBinh, a.player_id as id
    from actions as a
    join players as p on a.player_id = p.player_id
    join games as g on a.game_id = g.game_id
    where g.season = 2018 group by a.player_id) as x
join players as p on x.id = p.player_id
order by TrungBinh desc limit 10;
```

player_name	TrungBinh
James Harden	26.7436
Giannis Antetokounmpo	24.6944
Anthony Davis	24.2143
LeBron James	22.6727
Joel Embiid	22.2188
Kawhi Leonard	21.3000
Paul George	21.2468
Kevin Durant	21.0256
Stephen Curry	20.6377
Karl-Anthony Towns	20.4675

#### 14.Đưa ra top 20 cầu thủ bị turn over nhiều nhất

```

select player_name, turn_over from
(select sum(TURN_OVER) as turn_over, a.player_id as id
from actions as a
join players as p on a.player_id = p.player_id
join games as g on a.game_id = g.game_id
where g.season = 2018 group by a.player_id) as x
join players as p on x.id = p.player_id
order by turn_over desc limit 20;

```

player_name	turn_over
James Harden	387
Russell Westbrook	325
Trae Young	308
Ben Simmons	274
Giannis Antetokounmpo	268

**15) Đưa ra top 10 cầu thủ chơi cho nhiều đội bóng nhất từ mùa x->y**

```
select player_name, teams from
    (select count(distinct(team_id)) as teams, a.player_id as id
      from actions as a
     join players as p on a.player_id = p.player_id
     join games as g on a.game_id = g.game_id
    where g.season <= 2018 and g.season >= 2012
    group by a.player_id) as x
join players as p on x.id = p.player_id
order by teams desc limit 10;
```

player_name	teams
Corey Brewer	7
D.J. Augustin	7
Wayne Ellington	7
Ish Smith	7
Shelvin Mack	7
Luc Mbah a Moute	6
Marcus Thornton	6

**16) Đưa ra chuỗi trận thắng dài nhất của một đội trong mùa x**

```
DROP PROCEDURE IF EXISTS count_con_win;
DELIMITER //
```

```
CREATE PROCEDURE count_con_win(IN teamname VARCHAR(60), in
inputseason year, out c_win int)
BEGIN
    declare teamid varchar(11);
    DECLARE mp INT;
    declare lp int;
    declare gdate date;
    DECLARE done INT DEFAULT FALSE;
    declare max int default 0;
    declare curr_max int default 0;
    DECLARE cursor_i CURSOR FOR
with
temp as (select game_id, game_date from games
        where (home_team_id = teamid or visitor_team_id = teamid)
        and season = inputseason),
```

```

temp1 as (select a.game_id, sum(PTS) as MPTS
          from actions as a
          join temp as g on a.game_id = g.game_id
          where a.team_id = teamid group by a.game_id, a.team_id),
temp2 as (select a.game_id, sum(PTS) as LPTS from actions as a
          join temp as g on a.game_id = g.game_id
          where a.team_id != teamid group by a.game_id, a.team_id)
SELECT game_date, MPTS, LPTS from temp as t
      join temp1 as t1 on t.game_id = t1.game_id
      join temp2 as t2 on t.game_id = t2.game_id
      order by game_date;

DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = TRUE;
select team_id from teams where team_name = teamname into teamid;
OPEN cursor_i;
read_loop: LOOP
      FETCH cursor_i INTO gdate, mp, lp;
      IF done THEN
            LEAVE read_loop;
      END IF;
if mp > lp then
      set curr_max = curr_max + 1;
else
if curr_max > max then
      set max = curr_max;
end if;
      set curr_max = 0;
end if;
END LOOP;
CLOSE cursor_i;
set c_win = max;
END //
DELIMITER ;
call count_con_win("Celtics",2018,@con_win);
select @con_win;

```

@con_win
8



### 17) Đưa ra chuỗi trận thắng dài nhất của mỗi đội trong mùa x

```
DROP PROCEDURE IF EXISTS count_con_win_all;
DELIMITER //
CREATE PROCEDURE count_con_win_all(in inputseason year)
BEGIN
    declare teamid varchar(11);
    declare teamname varchar(100);
    DECLARE done INT DEFAULT FALSE;
    declare max int default 0;
    DECLARE cursor_i CURSOR FOR
        select team_name from teams;
    DECLARE CONTINUE HANDLER FOR NOT FOUND SET done =
TRUE;

        create table if not exists
            temp_table(team_name varchar(100),con_win int);
    OPEN cursor_i;
    read_loop: LOOP
    FETCH cursor_i INTO teamname;
        IF done THEN
            LEAVE read_loop;
        END IF;
        call count_con_win(teamname,inputseason, max);
        insert into temp_table(team_name, con_win) values(teamname, max);
    END LOOP;
    CLOSE cursor_i;
    select * from temp_table;
    drop table temp_table;
END //
DELIMITER ;

call count_con_win_all(2018);
```

team_name	con_win
Hawks	3
Celtics	8
Cavaliers	2
Hornets	4
Bulls	3

Mavericks	4
Nuggets	7
Warriors	11
Rockets	9
Clippers	6
Lakers	4
Heat	5
Bucks	7
Timberwolves	4
Nets	7
Knicks	3

### 18) Tìm ra top 10 cầu thủ ghi nhiều điểm trên sân khách nhất

```
select sum(PTS),player_name from actions as a
join games as g
on (a.game_id = g.game_id and a.team_id != g.home_team_id)
join players as p on a.player_id = p.player_id
where (season = 2018)
group by a.player_id order by sum(PTS) desc limit 10;
```

sum(PTS)	player_name
1338	James Harden
1099	Paul George
1063	Damian Lillard
1055	Bradley Beal
1042	Kemba Walker

### 19) Đưa ra cầu thủ ghi nhiều điểm nhất của mỗi đội trong trận x

with

```
temp as (select home_team_id as hid, visitor_team_id as vid, game_id as gid
from games where game_id=21200018),
```

```
temp1 as (select team_name,a.player_id,PTS,hid,t.gid as gid,player_name
from actions as a
join temp as t
on a.game_id=t.gid and t.hid=a.team_id
join teams as te on t.hid=te.team_id
join players as p on p.player_id=a.player_id
group by player_id order by PTS desc limit 1),
```

```
temp2 as (select team_name,a.player_id,PTS,vid,t.gid as gid,player_name
          from actions as a
          join temp as t
          on a.game_id=t.gid and t.vid=a.team_id
          join teams as te on t.vid=te.team_id
          join players as p on p.player_id = a.player_id
          group by player_id order by PTS desc limit 1)
```

```
select temp1.team_name,temp1.player_name,temp1.PTS,
       temp2.team_name,
       temp2.player_name,temp2.PTS,temp1.gid
from temp1 join temp2 on temp1.gid=temp2.gid;
```

team_name	player_name	PTS	team_name	player_name	PTS	gid
Hawks	Lou Williams	22	Rockets	James Harden	45	21200018

## 20) Đưa ra danh sách các cầu thủ thi đấu cho đội x trong mùa x

```
select player_name from actions as a
      join players as p on a.player_id = p.player_id
      join games as g on a.game_id = g.game_id
      join teams as t on a.team_id = t.team_id
where season = 2018 and team_name = "Celtics";
```

player_name
Terry Rozier
Jaylen Brown
Guerschon Yabusele
Jayson Tatum
Semi Ojeleye
Daniel Theis
Al Horford
Gordon Hayward
Kyrie Irving
Marcus Morris

**21) Tìm ra cầu thủ có tên bắt đầu bằng k kết thúc bằng g**

select player\_name from players where player\_name like "k%g";

player_name
Kyrie Irving
Keyon Dooling
Keith Appling

**22) Liệt kê đội bóng của mỗi thành phố**

select team\_city, group\_concat(team\_name) as Teams from teams group by team\_city;

team_city	Teams
Denver	Nuggets
Detroit	Pistons
Golden State	Warriors
Houston	Rockets
Indiana	Pacers
Los Angeles	Clippers,Lakers

**23) Top 10 cầu thủ thi đấu nhiều nhất mùa x (Tính theo phút)**

select player\_name, FLOOR(MIN+SEC/60) as MIN from  
(select sum(minute(MIN)) as MIN, sum(second(MIN)) as SEC,  
a.player\_id as id from actions as a  
join players as p on a.player\_id = p.player\_id  
join games as g on a.game\_id = g.game\_id  
where g.season = 2018 group by a.player\_id) as x  
join players as p on x.id = p.player\_id  
order by (MIN\*60 + SEC) desc limit 10;

player_name	MIN
Bradley Beal	3027
James Harden	2866
Kemba Walker	2862
Tobias Harris	2847
Paul George	2841
Damian Lillard	2837

## 24) Tìm trận đấu có chênh lệch điểm số lớn nhất mùa x

with

```
temp as (select a.game_id, a.team_id, sum(PTS) as pts
          from actions as a
          join games as g on a.game_id = g.game_id
          where season = 2018 group by a.game_id, a.team_id)
select g.game_id, abs(t1.pts-t2.pts) as pDiff
from games as g
join temp as t1
  on (g.game_id = t1.game_id and g.home_team_id = t1.team_id) join
temp as t2
  on (g.game_id = t2.game_id and g.visitor_team_id = t2.team_id)
group by g.game_id order by abs(t1.pts-t2.pts) desc limit 1;
```

game_id	pDiff
21800383	56

## 25) Tìm ra các đội mà cầu thủ a chơi

```
select distinct(team_name) from actions as a
join teams as t on a.team_id = t.team_id
join players as p on a.player_id = p.player_id
where player_name like "%Jeremy Lin%";
```

team_name
Rockets
Lakers
Bobcats
Nets
Hawks
Raptors

## 26) Đưa ra kết quả của các trận đấu mà đội a tham gia trong mùa x

with

```
temp1 as (select a.team_id as tid, a.game_id as gid, sum(PTS) as Lpoints
          from actions as a
          join games as g on a.game_id = g.game_id
          where season = 2018 and
          a.team_id not in
          (select team_id as t from teams where team_name = "Celtics")
          group by a.team_id, a.game_id),
temp2 as (select a.team_id as tid, a.game_id as gid, sum(PTS) as Mpoints
          from actions as a
          join games as g on a.game_id = g.game_id
          where season = 2018 and
          a.team_id in
          (select team_id as t from teams where team_name = "Celtics")
          group by a.team_id, a.game_id)
select temp1.gid, team_name, Lpoints, Mpoints from
(select game_id from games
  Where
  home_team_id in
    (select team_id as t from teams where team_name = "Celtics")
  or visitor_team_id in
    (select team_id as t from teams where team_name = "Celtics")) as g
join temp1 on g.game_id = temp1.gid
join temp2 on g.game_id = temp2.gid
join teams on temp1.tid = teams.team_id;
```

gid	team_name	Lpoints	Mpoints
21800268	Hawks	96	114
21800420	Hawks	108	129
21800683	Hawks	105	113
21801034	Hawks	120	129
21800319	Cavaliers	95	128
21800707	Cavaliers	103	123

**27) Đưa ra các cầu thủ thi đấu trong 2017 mà không thi đấu trong 2018**

```
select distinct player_name from actions as a
  join games as g on a.game_id = g.game_id
  join players as p on a.player_id = p.player_id
where season = 2017 and
  a.player_id not in
  (select player_id from actions as a
    join games as g on a.game_id = g.game_id
    where season = 2018 );
```

player_name
Jarrett Jack
Anthony Brown
Aaron Harrison
Rashad Vaughn
Jordan Mickey
Dakari Johnson
Chris McCullough
Darrun Hilliard
Joe Young
Vincent Hunter

**28) Tìm ra cầu thủ có tên dài nhất**

```
select player_name from players order by length(player_name) desc limit 1;
```

Player_name
Kentavious Caldwell-Pope

**29) Tìm ra rank các cầu thủ (xếp theo điểm của các cầu thủ trong một trận đấu)**

```
SELECT
    player_name,
    PTS,
    RANK() OVER (
        ORDER BY
        PTS DESC) pts_rank
FROM actions as a join players as p on a.player_id = p.player_id
where game_id = 21200018;
```

player_name	PTS	pts_rank
James Harden	45	1
Lou Williams	22	2
Jeremy Lin	21	3
Josh Smith	18	4
Marcus Morris	17	5
Al Horford	14	6
Jeff Teague	14	6

**30) In ra các cầu thủ và điểm ghi được của cầu thủ đó của đội x và phân loại nếu điểm >200 thì là KP, nếu 100<điểm<200 thì là RP1, nếu 50<điểm<100 thì là RP2, dưới 50 là Rookie.**

```
with
temp as ( select count(pts) as points, player_id
    from actions as a
    join (select team_id from teams where team_name = "Celtics") as t
    on a.team_id=t.team_id
    group by player_id order by points desc)
select player_name, t.points as points,
    CASE WHEN t.points >= 200 THEN "Key Player"
    WHEN (t.points > 100 and t.points < 200) THEN "Reserve Player 1"
    WHEN (t.points > 50 and t.points < 100) THEN "Reserve Player 2"
    ELSE "Rookie" END as CLASS
from temp as t join players as p on t.player_id = p.player_id
order by points desc;
```



player_name	Points	CLASS
Avery Bradley	263	Key Player
Marcus Smart	262	Key Player
Jared Sullinger	258	Key Player
Brandon Bass	245	Key Player
Kelly Olynyk	203	Key Player
Terry Rozier	198	Reserve Player 1
Jeff Green	196	Reserve Player 1