

HW1

A. Create tables

games:

```
mysql> describe games
-> ;
+-----+-----+-----+-----+-----+-----+
| Field      | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Game       | int       | NO   | PRI | NULL    |       |
| away       | char(3)   | NO   |     | NULL    |       |
| home       | char(3)   | NO   |     | NULL    |       |
| away_score | tinyint   | YES  |     | NULL    |       |
| home_score | tinyint   | YES  |     | NULL    |       |
| Date       | datetime  | NO   |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.02 sec)
```

inning:

```
mysql> describe inning
-> ;
+-----+-----+-----+-----+-----+-----+
| Field      | Type      | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Game       | int       | NO   | PRI | NULL    |       |
| Inning     | char(3)   | NO   | PRI | NULL    |       |
| Runs       | tinyint   | YES  |     | NULL    |       |
| Hits       | tinyint   | YES  |     | NULL    |       |
| Errors     | tinyint   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

hitters:

```
mysql> describe hitters;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Game       | int           | NO   | PRI | NULL    |       |
| Team       | char(3)       | NO   |     | NULL    |       |
| AB         | tinyint       | YES  |     | NULL    |       |
| R          | tinyint       | YES  |     | NULL    |       |
| H          | tinyint       | YES  |     | NULL    |       |
| RBI        | tinyint       | YES  |     | NULL    |       |
| BB         | tinyint       | YES  |     | NULL    |       |
| K          | tinyint       | YES  |     | NULL    |       |
| num_P      | tinyint       | YES  |     | NULL    |       |
| Position   | varchar(20)   | YES  |     | NULL    |       |
| Hitter_ID  | mediumint     | NO   | PRI | NULL    |       |
+-----+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)
```

pitchers:

```
mysql> describe pitchers;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Game       | int           | NO   | PRI | NULL    |       |
| Team       | char(3)       | NO   |     | NULL    |       |
| IP         | float         | YES  |     | NULL    |       |
| H          | tinyint       | YES  |     | NULL    |       |
| R          | tinyint       | YES  |     | NULL    |       |
| ER         | tinyint       | YES  |     | NULL    |       |
| BB         | tinyint       | YES  |     | NULL    |       |
| K          | tinyint       | YES  |     | NULL    |       |
| HR         | tinyint       | YES  |     | NULL    |       |
| PC_ST      | varchar(10)   | YES  |     | NULL    |       |
| Pitcher_ID | mediumint     | NO   | PRI | NULL    |       |
+-----+-----+-----+-----+-----+-----+
11 rows in set (0.00 sec)
```

pitches:

```
mysql> describe pitches;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| Pitch_ID | mediumint    | NO   | PRI | NULL    |       |
| Game     | int          | NO   | MUL | NULL    |       |
| EventID  | smallint     | NO   |     | NULL    |       |
| Num      | tinyint      | NO   |     | NULL    |       |
| Inning   | char(3)      | YES  |     | NULL    |       |
| Pitcher  | varchar(35)  | YES  |     | NULL    |       |
| Pitch    | varchar(50)  | YES  |     | NULL    |       |
| _Type    | varchar(20)  | YES  |     | NULL    |       |
| MPH      | smallint     | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.00 sec)
```

players:

```
mysql> describe players;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| ID    | mediumint     | NO   | PRI | NULL    |       |
| Name  | varchar(20)   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)
```

1.

char 會固定長度，空著的位置會補空白，計算時間較少但較容易浪費空間，varchar 則是以動態的方式決定長度，雖然較省空間但計算時間會較長。

2.

Foreign key 會指向其他 table 的 primary key，它的目的是要確保資料的完整性，但它會限制 foreign key 一定都要在 primary key 中存在，用 gaming 和 inning 來說，inning.Game 是 foreign key，gaming.Game 是 primary key，它限制了 inning 裡面的 Game 一定要在 gaming 裡面存在。

3.

1 byte for "tinyint" from -128 to 127，2 bytes for "smallint" from -2^{15} to $2^{15}-1$ ，3 bytes for "mediumint" from -2^{23} to $2^{23}-1$ ，4 bytes for "int" from -2^{31} to $2^{31}-1$ 。

4.

我覺得這個資料庫架構已經十分完整了，幾乎可以滿足所有需求，但如果可以修改的話，我會在 **games** 裡面新增一欄獲勝隊伍，對於之後在找尋時會比較有幫助。