

# 設計報告

## ER-Model 設計報告

### 題目說明中的預計 Database

- Bike
  - Serial Number
  - Factory, MaintenanceRecord, Is\_broken
- Location
  - Name
  - Address
    - City, District, Street
- Employee
  - Sex, Name, Ssn
- User
  - Sex, Name, Ssn
  - Rent history
    - BikeSerialnumber
    - Time
- Insurance
  - Type
  - Insuranceamount

### 更改處

1. Bike 增加 Is\_using attribute
  - 為了確保 Location 可以正確顯示，需要一個機制確定該 Location 有哪些單車
2. User 改為 (CardID, Name) ，並增加一個 Weak Entity 為
  - Rent History (Cost, Serial number, time)

因為 User 如果是單一的 attribute 存著歷史記錄，要從其他管道或的資訊需要從 User 查詢，因此用一個 Serial number 使 History 有一自主的 key 方便查詢。  
至於從 (Sex, Name, Ssn) 改為 (CardID, Name) 的原因為一個人可能有多張卡，因此只要求 CardID 以供辨識跟那張卡的暱稱 Name。

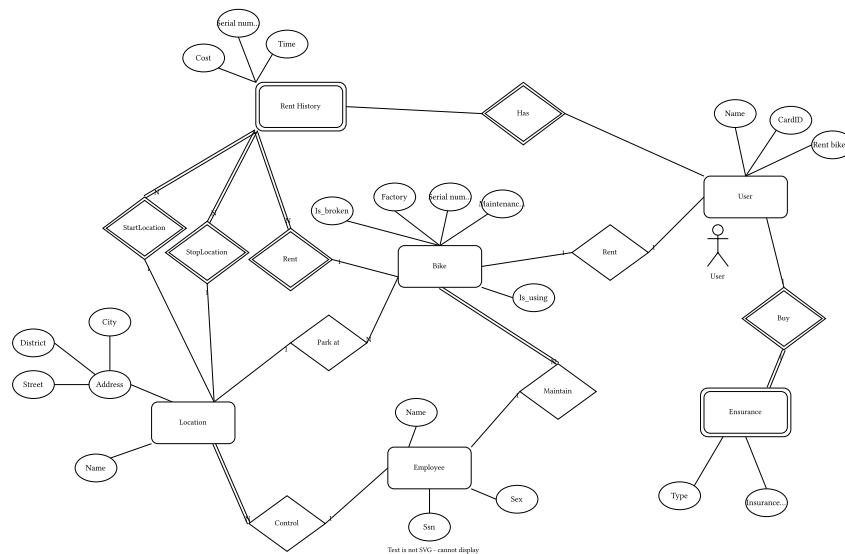


Figure 1: New Youbike ER-Model

## Relational Schema 設計報告

將 ER-Model 轉成 Database (無使用正規化)

use Youbike;

```
CREATE TABLE `User` (  
  `CardID` int NOT NULL,  
  `Name` varchar(20) NOT NULL,  
  `Rent_bike_serial` int,  
  PRIMARY KEY (`CardID`)  
);  
CREATE TABLE `Bike` (  
  `Serial_num` int NOT NULL,  
  `Factory` varchar(60) NOT NULL,  
  `Is_broken` bool NOT NULL,  
  `Is_using` bool NOT NULL,  
  `Maintenance_record` int NOT NULL,  
  `Maintenance_Employee` int NOT NULL,  
  `Park_loc` varchar(20) NOT NULL,  
  PRIMARY KEY (`Serial_num`)  
);  
CREATE TABLE `Location` (  
  `Name` varchar(20) NOT NULL,  
  `Street` varchar(30) NOT NULL,  
  `District` varchar(30) NOT NULL,  
  `City` varchar(30) NOT NULL,  
  `Control_Employee` int NOT NULL,  
  PRIMARY KEY (`Name`)  
);  
CREATE TABLE `Employee` (  
  `Ssn` int NOT NULL,  
  `Name` varchar(20) NOT NULL,  
  `Sex` varchar(10) NOT NULL,  
  PRIMARY KEY (`Ssn`)  
);  
CREATE TABLE `Ensurance` (  
  `CardID` int NOT NULL,  
  `Type` int NOT NULL,  
  `Amount` int NOT NULL,  
  PRIMARY KEY (`CardID`, `Type`)  
);  
CREATE TABLE `Rent_history` (  
  `Start_loc` varchar(30) NOT NULL,  
  `Stop_loc` varchar(30) NOT NULL,  
  `Bike_serial` int NOT NULL,  
  `User_cardID` int NOT NULL,  
  `History_serial` int NOT NULL,  
  `Cost` int NOT NULL,  
  `Time` int NOT NULL,  
  PRIMARY KEY (  
    `Start_loc`,  
    `Stop_loc`,  
    `Bike_serial`,  
    `User_cardID`,  
    `History_serial`  
  )  
); -- more constraint in repo/sql_src/bike.sql
```

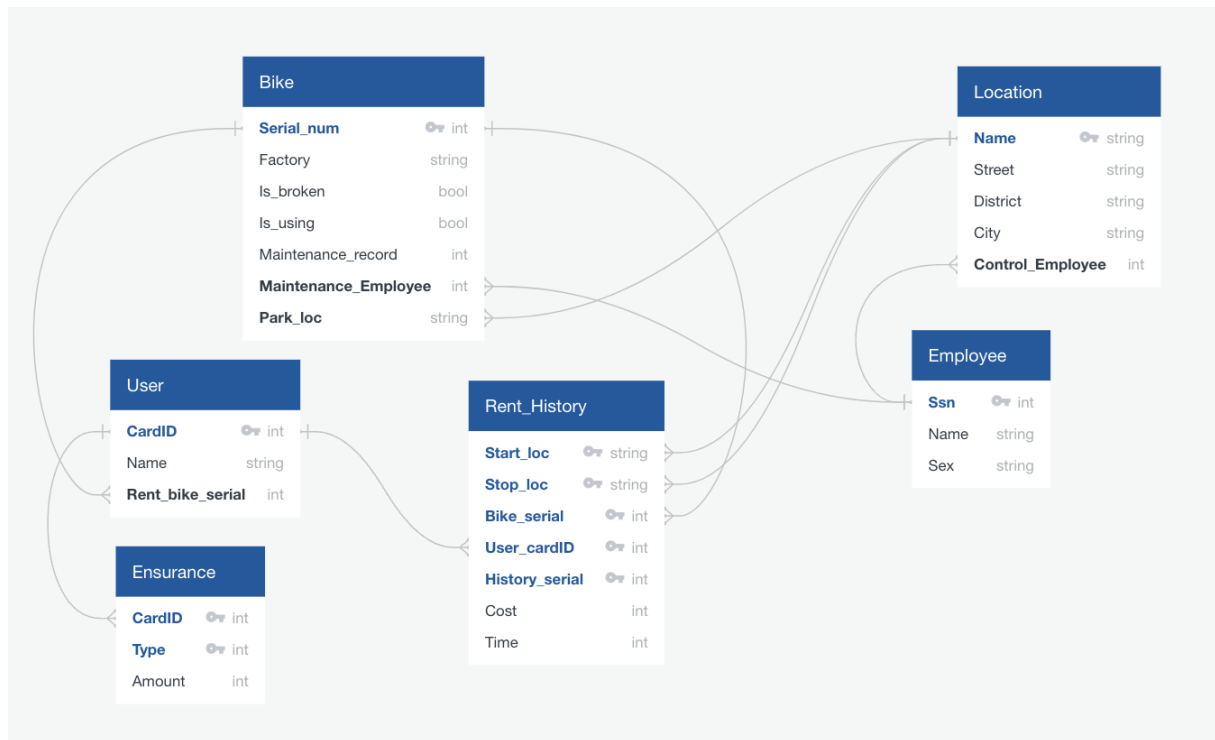


Figure 2: Database visualize via QuickDBD