**Requirements:**

1. A scanner needs to be installed at one device location, but one device location can have multiple scanners installed.
2. Device locations can belong to tram, bus or stop stations. (Only tram and bus will have scanners in the vehicle; the rest of the scanners should be at the stop stations)

**一張含有 文字, 圖表, 方案, 圖解 的圖片

AI 產生的內容可能不正確。**

**Assumptions & Justifications:**

1. All vehicles require a touch-on and off (the current tram system doesn’t require a touch-off):

**Changes**:

* + This assumption will change the mechanism only deducts when “touching off.”
  + The forgot-to-touch-off rule remains the same. If passengers forget to touch off, the system will deduct the “Zone1+2 2 hours” fee.

**Benefits**:

* + Uniforming the myki-using behaviour. For passengers, it is more intuitive and friendly to memorise the rules. For PTV, we can gain more trip data from users for tram usage.
  + The company will have the flexibility to adjust the payment mechanism from zone-based pricing to distance-based pricing.

1. So far, we only discuss the Metropolitan tram, train and bus in this design.
2. We consider top-up machines to be a type of scanner as well. We don’t focus on the top-up mechanism here
3. We can see online transactions (top-up or buying myki pass) as happened at DeviceLocation -> location\_type = ‘online’
4. Every vehicle is equipped with a GPS and will send a real-time log (VehicleRealTimeLog) every few seconds.
5. VehicleStopLog is generated from VehicleRealTimeLog. The system determines whether a vehicle is entering or leaving a stop based on its latitude and longitude: if the vehicle is within 50 meters of a station, it is considered “entering” the stop; otherwise, it is considered “leaving.”

**Pricing rule:**

* Apply to tram, train and bus travel

**Entities:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Description** | **Attributes** | **Note** |
| **MykiCard** | * Identify users and deduct objects * Can be anonymous (no link to customer account needed) | * card\_id (PK) * balance * customer\_id (nullable FK) |  |
| **Trip** | * Represents a single **transport journey** (from touch on to touch off) * Every touch-on action will have a corresponding trip record * A trip may or may not involve an actual fare charge | * trip\_id (PK) * card\_id (FK) * touch\_on\_time * touch\_on\_scanner\_id * touch\_on\_stop\_station\_id * touch\_off\_time (nullable) * touch\_off\_scanner\_id (nullable) * touch\_off\_stop\_station\_id (nullable) * fare\_charged * fare\_type * fare\_calc\_method |  |
| **Transaction** | * Represents a **monetary action** (deduction, top-up or buying a pass) on the card. * A trip may generate **zero or one** fare-related transaction. | * transaction\_id (PK) * card\_id (FK) * trip\_id (nullable FK) * scanner\_id (FK) * amount * type * timestamp |  |
| **Scanner** | * The machine used to scan the Myki card * Make the record once a myki card touches |  |  |
| **DeviceLocation** |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Actions:**

**TouchOn()**

**Trip → scanner\_id → device\_location → vehicle\_id → find current run\_id → lookup VehicleStopLog or VehicleRealTimeLog → infer StopStation → derive Zone → calculate fare**

References:

Myki Interstate travel: <https://www.ptv.vic.gov.au/more/travelling-on-the-network/interstate-travel/>

Myki pricing: <https://www.ptv.vic.gov.au/tickets/fares/metropolitan-fares/#defaultfares>

Stop Station data: <https://discover.data.vic.gov.au/dataset/annual-regional-train-station-patronage-station-entries/resource/f93a819a-351e-4242-a6f3-74d92cd682dc>