Entities:

	Description	Attributes	Note
CustomerAccount	• Represents registered customer accounts • May hold 0 or more MykiCards	• customer_id (PK): VARCHAR(50) • full_name: VARCHAR(100) • email: VARCHAR(50) • phone_num: VARCHAR(20) • address: VARCHAR(100) • dob: DATE • register_date: DATETIME • account_status: VARCHAR(20) • password_hash: VARCHAR(256)	• Optional: card may be anonymous
MykiCard	• Identify users and deduct objects • Can be anonymous (no link to customer account needed) • Used to initiate trips and hold value	• card_id (PK): VARCHAR(50) • balance: DECIMAL(10,2) • customer_id (nullable FK): VARCHAR(50) • card_type: VARCHAR(20) • myki_pass: VARCHAR(50)	• Linked to lookup table CardType contained: Full-fare Concession Child Senior
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	• trip_id (PK): VARCHAR(50) • card_id (FK): VARCHAR(50) • touch_on_time: DATETIME • touch_on_scanner_id: VARCHAR(50) • touch_on_stop_station_id: VARCHAR(50) • touch_off_time (nullable): DATETIME	• Fare-related value can be derived and updated later when detected touch-off action

	an actual fare charge	• touch_off_scanner_id (nullable): VARCHAR(50) • touch_off_stop_station_id (nullable): VARCHAR(50) • fare_charged: DECIMAL(10,2) • fare_type: VARCHAR(20) • fare_calc_method: VARCHAR(20)	
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. (May within 2 hours free period)	• transaction_id (PK): VARCHAR(50) • card_id (FK): VARCHAR(50) • trip_id (nullable FK): VARCHAR(50) • scanner_id (FK): VARCHAR(50) • amount: DECIMAL(10,2) • type: VARCHAR(20) • timestamp: DATETIME	• Types may include like 'TopUp', 'FareDeduction', and ‘Mykipass’
Scanner	• Make the record once a myki card touches • Physical or virtual(online) scanning device used for touch-on/off or any interaction regarding Myki card	• scanner_id (PK): VARCHAR(50) • device_location (FK): VARCHAR(50)	• Online transactions will be seen as one type of scanner that device_location is ‘online’ • Connected to either vehicle or stop station via DeviceLocation
DeviceLocation	• Abstracts the physical context where a scanner is installed	• device_location_id (PK): VARCHAR(50) • vehicle_id (nullable FK): VARCHAR(50) • stop_station_id (nullable FK): VARCHAR(50) • location_type: VARCHAR(20)	• Location_type can include vehicle, stop station, online

StopStation	• Represents a physical transport stop or station	• stop_station_id (PK): VARCHAR(50) • name: VARCHAR(100) • zone_id: VARCHAR(20) • geo_point: GEOGRAPHY	• geo_point used for GPS-based arrival inference that record longitude and latitude • zone_id will be either 'Zone1', 'overlap', or 'Zone2'
Route	• Represents a public transport route	• route_id (PK): VARCHAR(50) • route_name: VARCHAR(100) • route_type: VARCHAR(50) • start_time_of_day: TIME • last_run_time: TIME	• One route consists of multiple RouteStops
RouteStop	• Defines the sequence of stops along a route	• route_id (PK): VARCHAR(50) • stop_station_id (PK): VARCHAR(50) • direction (PK): VARCHAR(10) • scheduled_arrival_time: TIME	• Composite PK defines stop identity within route direction
Vehicle	• Represents a physical transport vehicle	• vehicle_id (PK): VARCHAR(50) • vehicle_type: VARCHAR(20)	• Values include metropolitan_bus, metropolitan_tram, etc.
VehicleRun	• A single operational instance of a vehicle on a route	• run_id (PK): VARCHAR(50) • vehicle_id (FK): VARCHAR(50) • route_id (FK): VARCHAR(50) • direction: VARCHAR(10) • start_time: DATETIME	• Used to track daily or scheduled trips of a vehicle
VehicleStopLog	• System-inferred record when a vehicle stops at a station	• stop_log_id (PK): VARCHAR(50) • vehicle_id (FK): VARCHAR(50)	• Derived from real-time logs

		• run_id (FK): VARCHAR(50) • stop_station_id (FK): VARCHAR(50) • actual_arrival_time: DATETIME • actual_departure_time: DATETIME	
VehicleRealTimeLog	• Records GPS position of a vehicle at a given time	• live_log_id (PK): VARCHAR(50) • vehicle_id (FK): VARCHAR(50) • stop_station_id (nullable FK): VARCHAR(50) • vehicle_lat: DECIMAL(9,6) • vehicle_long: DECIMAL(9,6) • timestamp: DATETIME	• Used to infer actual stops and arrival