CityLink Farebox

Story

CityLink is a tap-in metro card. The billing rules evolved over years, and no one wrote them down. You've been given **an anonymized tap data and per-tap charges** for one rider. Your job is to:

Goal: Reproduce the charges in the tap log exactly by discovering the underlying fare rules. Then code a small OOP engine to apply your rules to new taps.

Artifacts you have

- Tap log (time, station, line → charged ₹amount).
- No official rules. Your job is to infer them with the fewest simple rules.

Constraints

- Java OOPs mandatory. If you are comfortable with Collections, Generics, etc – you can use them, otherwise Arrays + primitives are fine.
- Each rule can be toggled by a Boolean.
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Datetime	Line	Given Fare	Station Code
07-01 07:20	G	25	BD
07-01 08:01	G	37.5	NC
07-01 08:30	R	0	YH
07-01 08:32	Y	37.5	YH
07-01 10:01	R	25	KL
07-01 10:28	Y	0	NC
07-01 10:32	Y	25	JT
07-01 14:36	G	25	NC
07-01 22:15	Y	20	BD
07-01 23:58	G	20	NC
07-02 00:45	X	16.25	NC
07-02 01:10	G	0	BD
07-02 04:01	G	25	BD
07-02 13:05	Y	25	JT
07-02 13:15	G	0	KL
07-02 13:36	G	25	JT
07-02 18:02	Y	37.5	BD
07-02 18:18	Y	0	NC
07-02 20:01	G	25	KL
07-02 20:15	R	0	YT
07-02 22:02	Y	20	KL
07-02 23:15	G	20	BD
07-03 00:20	R	16.25	NC

Rules Considered:

R1 - Base Fare is 25 irrespective of Line

R2 - Peak period: 8 am to 10 am and 6 pm to 8 pm

R3 - From time of buying the base fare there is a 30-minute window where price is free (Transfer Window)

R4 - Night discount – 20% (10 am to midnight)

R5 - Post Midnight Discount – 35% Discount (midnight to 4 am)

Deliverables

1. **Hypothesis brief (max 1 page):** list the applicable rules (R1…Rx) you believe explain the data. Each rule must be testable.
2. **Class design note (8–10 lines):** why these classes, responsibilities, and extension points.
3. **Code** that:
    - Implement the rules
    - Applies your rules in a TariffEngine to compute charges. Implement rules as small classes; chain them in TariffEngine
4. **Switch tests on/off**: each rule can be toggled by a Boolean so you can A/B your hypothesis quickly.