1. Payment Recommendation [JAVA 8]

Payments are a very important step in a user journey during the process of checkout. It becomes even more important to be suggesting the right payment instruments to ensure smoother customer experience, better conversion & also apply transaction limits (as mandated by regulation & compliance).

Let's consider the use cases of Credit card bill payment, Commerce purchase and Investment purchase (These are called Lines of business, more lines of business can also be added in the future).

Also, consider the case where the supported payment instruments are Credit Card, UPI, Debit Card and NetBanking (Note - Wallet and other instruments can be supported in the future)

Line of business use case	Credit Card	UPI	Debit card	Net banking	Relevance Based Ordering
Credit card bill payment	Not allowed ⛔ (Regulation)	Allowed ✅ Limit of 2L INR per transaction	Allowed ✅ Limit of 2L INR per transaction	Allowed ✅ Limit of 2L INR per transaction	1. UPI 2. NetBanking 3. Debit card
Commerce (purchase)	Allowed ✅ Limit of 2.5L INR per transaction	Allowed ✅ Limit of 1L INR per transaction	Allowed ✅ Limit of 2L INR per transaction	Not allowed ⛔ (Customer experience)	1. Credit card 2. UPI 3. Debit card
Investment	Not allowed ⛔ (Regulation)	Allowed ✅ Limit of 1L INR per transaction	Allowed ✅ Limit of 1.5L INR per transaction	Allowed ✅ Limit of 1.5L INR per transaction	1. UPI 2. NetBanking 3. Debit card

Note - If the user has multiple payment instruments for a particular type (Ex: multiple UPI accounts), we can leverage the relevanceScore (between 0 to 1, 1 being most relevant, 0 being least relevant) and order them accordingly in a way that the instrument which is most relevant is shown on top as compared to the instrument with a lower relevance score.

Functionality

For the purpose of implementation, you are given the following entities

1. **Payment Instrument**
    1. **Each payment instrument is uniquely identified by an identifier (field)**

    2. **The instrument type can be one of the following - Credit Card, UPI, Debit Card, NetBanking**

    3. **The issuer can be one of the following - HDFC, AMEX, SBI, CITI, AXIS or ICICI**

    4. **As mentioned above, each payment instrument will also have a relevance score (this would be between 0 to 1, 1 being most relevant)**

2. **Cart**
    1. **Each cart will belong to one of the following line of business - Credit Card bill payment, Commerce or Investment (as mentioned above, more line of business can be added in the future)**

    2. **Cart will consist of one or more Cart Items**

    3. **Cart will have a total cart amount**

3. **User**
    1. **User is uniquely identified by a userId**

    2. **User will also have a UserContext (details below)**

    3. **User will have a set of payment instruments**

4. **User Context**
    1. **The user context will have details about the device that the user is currently using (called DeviceContext)**
        1. **Device Context would have one attribute called UPI enabled (which is either true or false)**

The UPI enabled flag determines whether the device has the capability enabled to allow for UPI

The UPI enabled flag determines whether the device has the capability enabled to allow for UPI payments. If the user has a payment instrument of type UPI but the device doesn't have UPI enabled, the user won't be able to use his payment instruments of type UPI (across all issuers & all lines of business).

- You are required to implement the logic of the payment recommendation for a given User (User having a User Context along with the User Payment instruments) and a Cart (Line of business, Cart Items and Cart amount) and the logic would return the list of payment instruments (from the user payment instruments) which are allowed to be used along with the ordering logic as mentioned above.

- Please consider that a new line of business can be added in the future in your implementation (so the implementation needs to account for extensions).

- Please consider that new types of payment instruments (Ex: wallet) can be added in the future scope.

Example

Consider the following example, User U1 has the following payment instruments

Name	Payment Instrument Type	Issuer	Relevance Score
SBI Debit Card	Debit Card	SBI	0.91
SBI UPI	UPI	SBI	0.85
HDFC UPI	UPI	HDFC	0.88
SBI Savings account	NetBanking	SBI	0.86
HDFC Diners Credit Card	Credit Card	HDFC	0.70

The U1 User Context has UPI enabled = true (via the Device Context), so the device has UPI enabled and the above UPI instruments (SBI UPI and HDFC UPI) can be used.

Given the cart for Investment (line of business), cart amount of 10,000 INR (Ex: for SIP purchase)

The final ordered list of payment instruments (as the logic of payment recommendation) would be as follow

The U1 User Context has UPI enabled = true (via the Device Context), so the device has UPI enabled and the above UPI instruments (SBI UPI and HDFC UPI) can be used.

Given the cart for Investment (line of business), cart amount of 10,000 INR (Ex: for SIP purchase)

The final ordered list of payment instruments (as the logic of payment recommendation) would be as follow:

Final Order	Name	Payment Instrument Type	Issuer	Relevance Score	comments
1	HDFC UPI	UPI	HDFC	0.88	• Device has UPI enabled • The cart amount is 10,000 INR which is less than the UPI transaction limit of 1L INR (for investment purchase)
2	SBI UPI	UPI	SBI	0.85	• Device has UPI enabled • The cart amount is 10,000 INR which is less than the UPI transaction limit of 1L INR (for investment purchase)
3	SBI Savings Account	NetBanking	SBI	0.86	• NetBanking can be used for investments and the cart amount (10,000 INR) is below the limit of 1.5L INR per transaction.
4	SBI Debit Card	Debit Card	SBI	0.91	• Debit Card can be used for investment purchase • The cart amount (10,000 INR) is below the limit of 1.5L INR

					per transaction.

Note:

- **The following ordering logic is used for Investment - line of business**
    - **UPI**
    - NetBanking
    - Debit Card
- **HDFC Diners Credit Card was not suggested as the payment Instrument in above list as**
- **Credit cards are not allowed for investment purchase**
- **If there are multiple instruments of the same payment instrument type then the one with higher relevance score would be shown on top.**
    - **HDFC UPI is shown above SBI UPI , as the relevance score for it is higher**

Expectations

- **You can implement the functionality in one of the programming languages (Java, Golang, Ruby, JS or Python)**

- **Please don't create REST APIs or any UI for the same.**

- **You can test the functionality using unit test cases.**

- **The focus is on the core functionality and how it is implemented v/s how it is presented (UI or API structure).**

- **Please use the coding best practices (SOLID, DRY etc.) and ensure that you are writing modular & extensible code (to accommodate any future changes in functionality)**

- **The submitted code would be judged on both coding best practices and functional correctness.**