

A Comprehensive Aspect-oriented Use Case Method for Modeling Complex Business Requirements

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Aspect-oriented Vs. Object-oriented

Complex business requirements cannot always be effectively modeled by the traditional object-oriented use case approach due to some cross-cutting concerns, known as *aspects*. The aspect-oriented approach has been proposed to represent the cross-cutting concerns or aspects independently from primary concerns.

What is Aspect?

“ Non-functional requirements: security, availability, performance, maintainability, response time, etc.

Can aspects be functional requirements?

- “ Included requirements or subordinate requirements
- “ Extending requirements or optional requirements
- “ Business rules

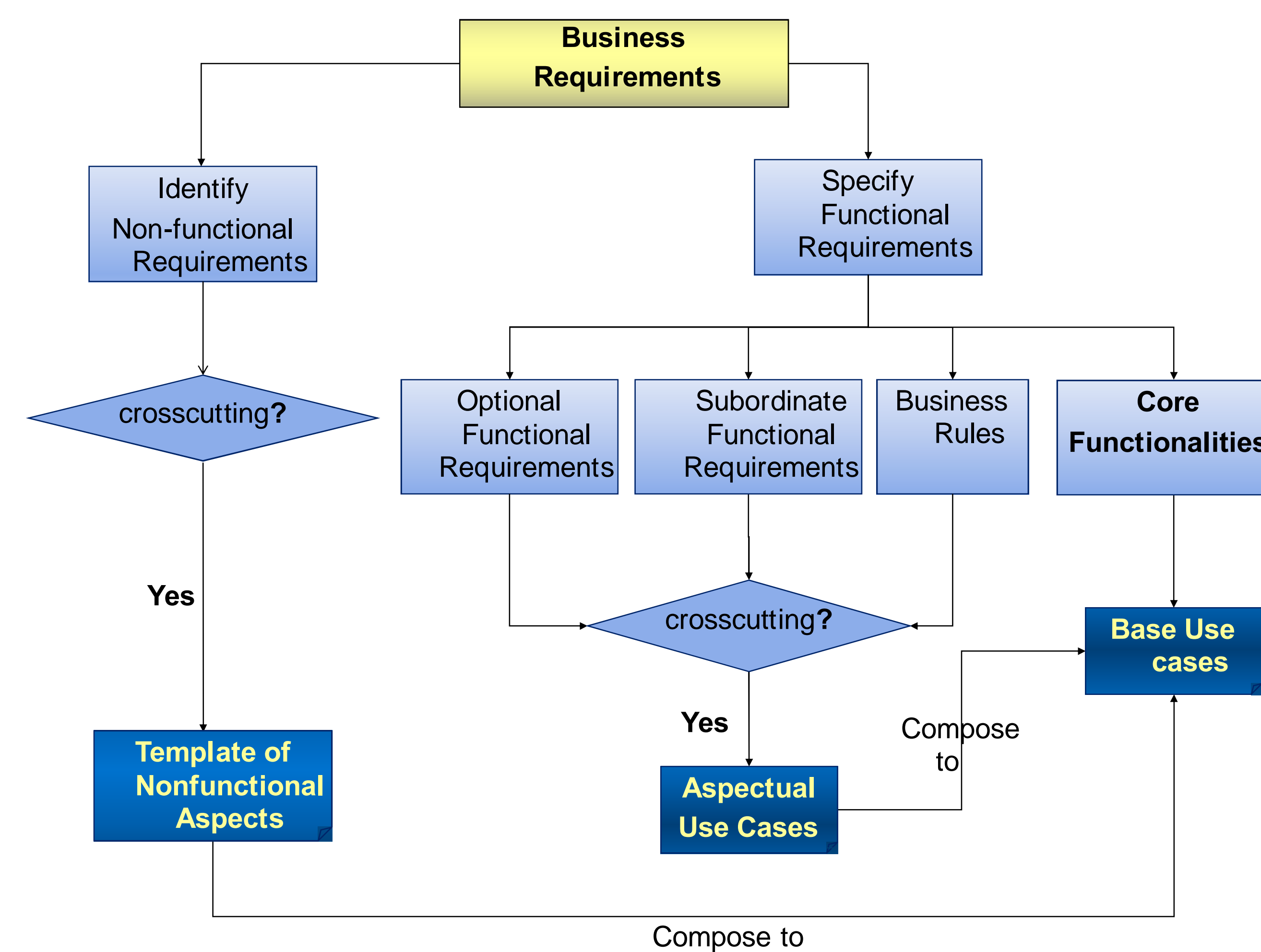
Purpose

The purpose of this research is to establish a *comprehensive* aspect-oriented use case method to represent the aspect candidates identified from complex business requirements and separate them from the core applications at the early stage of system development.

Contribution

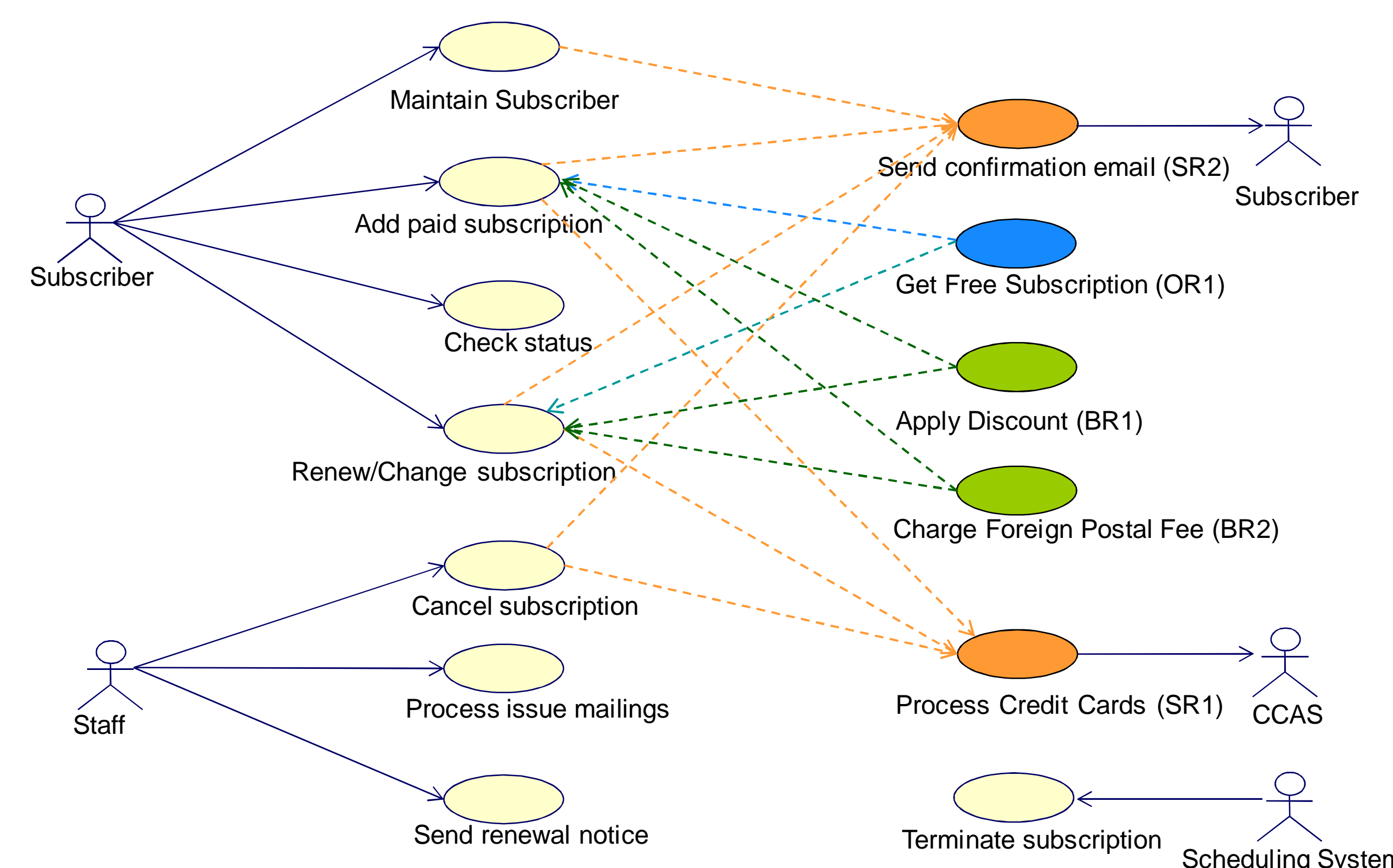
- “ Expand aspect candidates with business rules
- “ Offer a systematic approach to identify different potential aspects from complex business requirements.
- “ Provide a comprehensive model for representing the identified aspects and their composition to the core functionalities at early stage of software development.

Framework of Aspect-oriented Use Case Method



Case Study

-Subscription Automation System



The composition of aspectual use cases and non-functional aspects to the base use case

USE CASE Name	Get Free Subscription	USE CASE Name	Process Credit Card
Level	Aspect	Level	Aspect
Type	Extension	Type	Inclusion
Goal	To Obtain free subscription	Goal	To process charges and refunds as related to subscriptions
Actor	Subscriber	Condition	The subscriber submits credit card information
Condition	The subscriber is the author of the articles or the member of the editorial board	Actor Action	System Action
Advice	<ul style="list-style-type: none"> 1. Displays the subscription data to confirm 2. Accepts and clicks to proceed 3. Determines the ending date and renew warning date 4. Assigns a subscription ID 	<ul style="list-style-type: none"> 1. Send the credit information to CCAS 2. Return the successful status flag 3. Returns to the primary flow of the base use case 	
Label	CheckingEligibility	Label	SubmittingCredit Information
Pointcut	<ul style="list-style-type: none"> Add Paid Subscription. Check Eligibility for Free Subscription Renew/Change Subscription. Check Eligibility for Free Subscription 	Corresponding Join Points	<ul style="list-style-type: none"> Add Paid Subscription. Submit Credit Information Renew/Change Subscription. submit Credit Information Cancel Subscription.Submit Credit Information

USE CASE Name	Add Paid Subscription
Level	Base
Goal	To obtain a paid subscription of the HOST
Overview	o
Actor	Subscriber, Staff
Trigger	The subscriber has chosen 'Paid Subscription' option
Advice	<ul style="list-style-type: none"> o o o 5. Calculates the total subscription fee o 9. Enters the name on the Credit Card, Credit Card type, Credit Card No., and expiration date. Then, submit the payment data. o o 11. Assigns a subscription ID o
Nonfunctional Aspects	Response time
Join Points	<ul style="list-style-type: none"> Label JP1. Check eligibility for free subscription JP2. Submit Credit Information JP3. Confirm successful subscription JP4. Check subscription period JP5. Check subscriber's address
Position	<ul style="list-style-type: none"> Before step 5 Within step 9 After step 11 Within step 5 Before step 5

USE CASE Name	Apply Discount	Nonfunctional Aspect Name	Response Time
Level	Aspect	Goal	To Improve the Performance of the system
Type	Business Rule	Description	Information should be accessed and displayed within 5 seconds
Goal	To apply 10% discount of subscription fee	Affected Use Cases	Maintain Subscriber; Add Paid Subscription; Check Status; Renew/Change Subscription; Cancel Subscription
Actor	Staff	Relations to other Non-functional Aspects	Positive: o, Negative: o
Condition	The number of subscription year is greater than one.	Priority	Second
Advice	<ul style="list-style-type: none"> 1. Discount the subscription fee by 10% for the first 3 subscription years. 2. Shows the subscription period and discounted subscription fee to confirm 3. Accepts and clicks to proceed 4. Returns to the primary flow of the base use case 		
Label	CheckingSubscription Period		
Pointcut	<ul style="list-style-type: none"> Add Paid Subscription. Check Subscription Period Renew/Change Subscription .Check Subscription Period 		

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