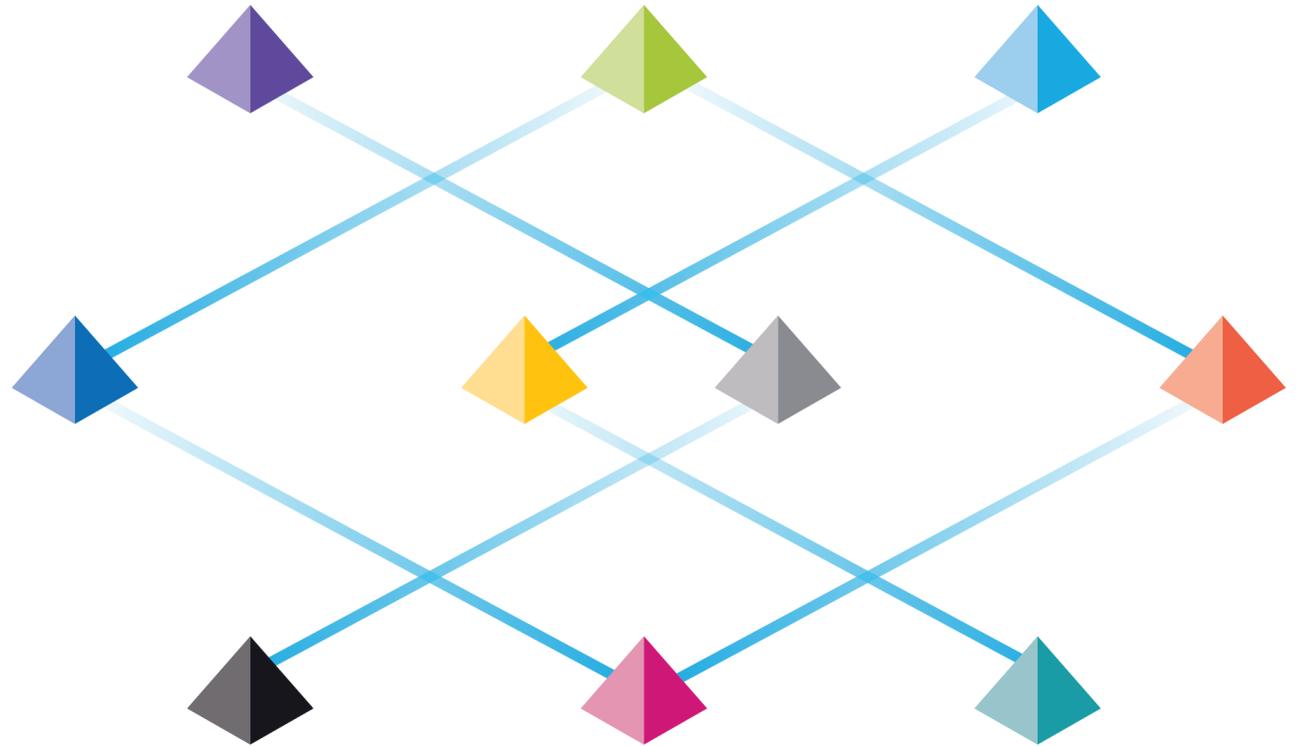


# DAY2.S3. Web Automation



# Web Automation

웹 어플리케이션 자동화를 위한 설계, 브라우저 모드 기반 모델링, 워크큐가 포함된 개발 실습을 통해 웹 어플리케이션 자동화 동작방식을 이해하고 오브젝트 기반 개발 방법론을 숙지함.

- 브라우저 모드 동작 원리
  - Application Modeler – Blue Prism Messaging Host – Browser extension 관계 이해
  - Browser 설정
  - Extension 관련 정책 (registry)
- 브라우저 모드 어플리케이션 모델링
  - 브라우저 세션의 실행 및 접속, 종료
  - 브라우저 모델링 실습
    - HTML 컴포넌트 식별: Input box, Radio, Checkbox, Drop-down, Table, Button
    - Dynamic path 설정 (WebPath/XPath)
    - 중복 컴포넌트 식별 (Match Index)
    - 브라우저 모델링 모드 변환 & UI Automation
  - 웹 element 제어 및 양식 작성
- 프로세스 & 오브젝트 기반 설계 & 구현
  - 오브젝트 단위 모듈화 이해
  - 프로세스와 오브젝트, 오브젝트와 오브젝트간 매개변수 전달 방식 이해
- 워크큐 기반 프로세스 구현
  - 워크큐 기반 데이터(Work Item) 입/출력 방식 이해
  - 워크큐 기반 프로세스간 통신 방식 이해
- XPath 활용법
  - XPath 개념 이해
  - Dynamic XPath 활용법



# 브라우저 모드 동작 원리 - 설치

## Blue Prism 설치

← Back

blueprism

**Advanced**

Which features would you like to install?

**Blue Prism 설치와 함께 브라우저 확장도구가 자동으로 정상 설치되었는지 확인.**

**NOTE** 확장도구가 설치되지 않은 경우 브라우저 모드를 사용할 수 없게 되므로, 해당 사이트의 보안정책이나 그룹정책을 검토해야 함.

- Blue Prism
  - Outlook automation
  - Google Sheets automation
  - Chrome browser extension
  - Firefox browser extension
  - Edge browser extension
  - Citrix automation
  - Citrix agent

Reset Disk usage Help

Install

## 브라우저 확장도구

확장 프로그램

암추해제된 확장 프로그램을 로드합니다. 확장 프로그램 압축 업데이트

조직에서 관리하는 브라우저입니다.

- Bitly URL Shortner 1.4.1
- Blue Prism 7.1 Browser Extension 7.1.0.59614**
- Diigo Web Collector - Capture and Annotate 3.4.8
- Google Docs 오프라인 1.50.1

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https://portal.blueprism.com

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**PRODUCT VISION & ROADMAP UPDATE**

Discover what's new at SS&C Blue Prism!  
Webinar | February 2, 2023

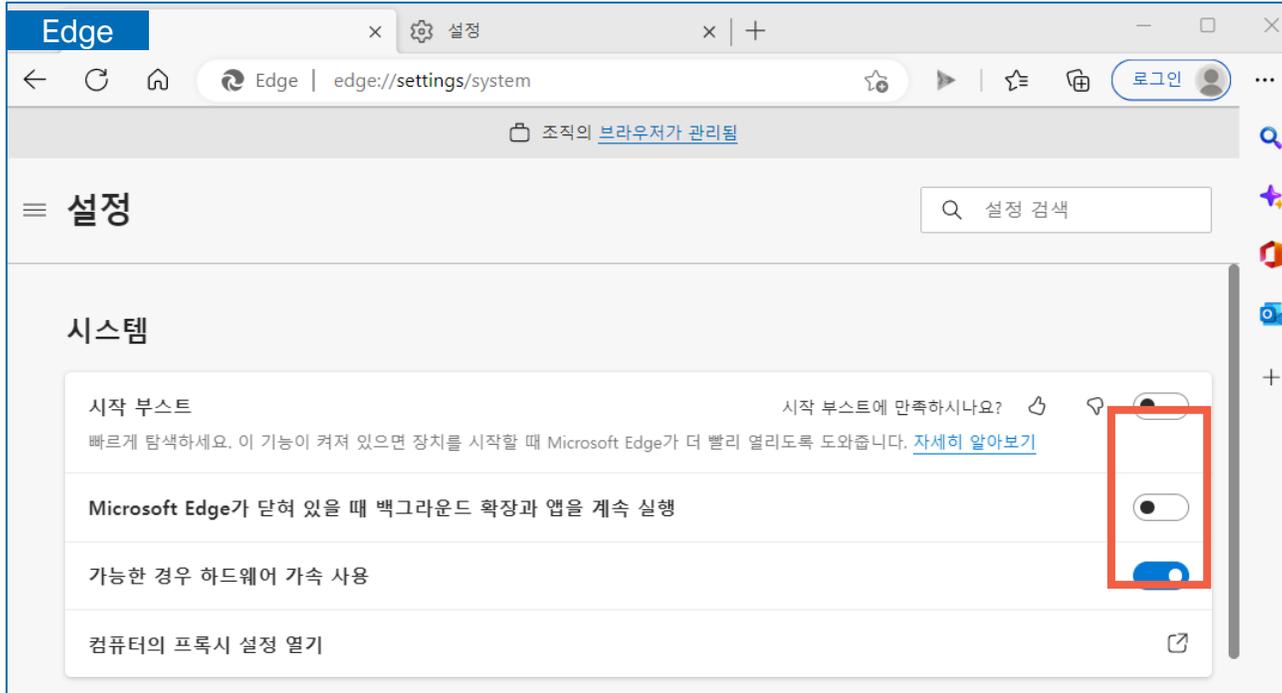
REGISTER

Feedback



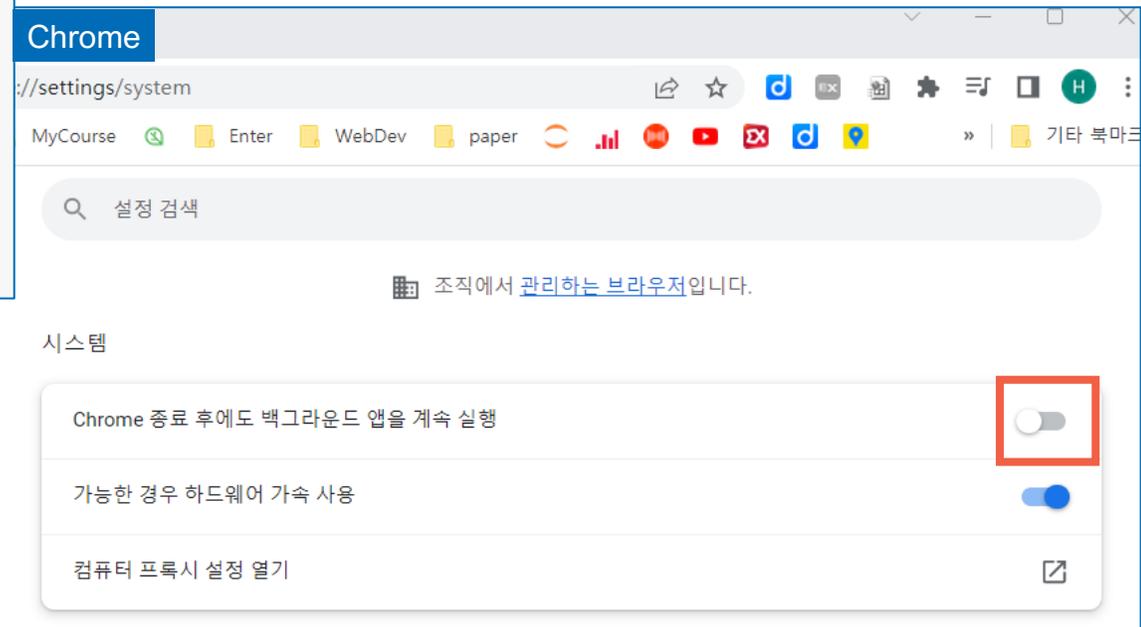
# 브라우저 모드 동작 원리 - 설정

## 시작 부스트(Startup Boost) 비활성화



**Startup boost** keeps the browser running in the background with minimal processes when the browser is closed, which has a limited impact on device resource usage. Startup boost does not add any additional resources when browser windows are already open. <Microsoft>

**This feature** has been seen to cause issues with both spying and launching the Edge and Chrome browsers, so you may see the **'Browser not detected'** exception when this feature is enabled. Our Blue Prism Development team is currently investigating this issue under development reference BP-8349, to see if there is a way we can influence this behaviour from within Blue Prism. <BluePrism>



## Extension 관련 정책 (registry)

### Chrome

HKEY\_LOCAL\_MACHINE\SOFTWARE\Policies\Google\Chrome\ExtensionInstallForcelist  
HKEY\_LOCAL\_MACHINE\SOFTWARE\WOW6432Node\Google\Chrome\NativeMessagingHosts\com.blueprism.messaging

### Edge:

HKEY\_LOCAL\_MACHINE\SOFTWARE\WOW6432Node\Microsoft\Edge\Extensions  
HKEY\_LOCAL\_MACHINE\SOFTWARE\WOW6432Node\Microsoft\Edge\NativeMessagingHosts\com.blueprism.messaging



# 브라우저 모드 동작 원리 – Native Messaging Host

**Browser extension** ← **Native Messaging Host**

**Application Modeler**

Define the elements of an application that will be used by Object Studio

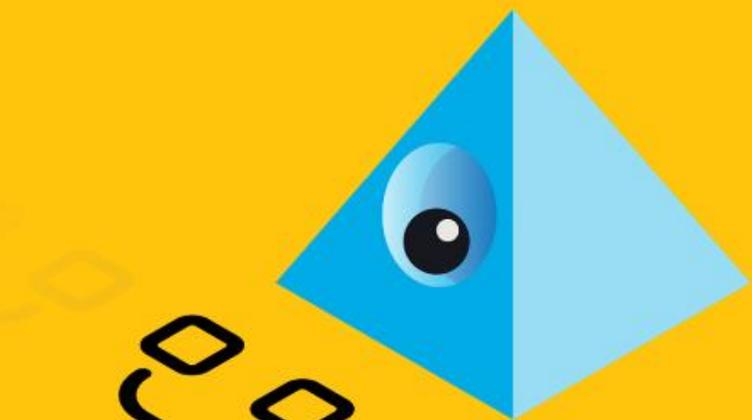
Application Model belongs to this Object

Filter the tree... Element Details

Name	Match	Match Type	Value
Window Text	<input checked="" type="checkbox"/>	= (Equal)	
Visible	<input checked="" type="checkbox"/>	= (Equal)	True
Start Y	<input checked="" type="checkbox"/>	= (Equal)	224
Start X	<input checked="" type="checkbox"/>	= (Equal)	139
Screen Visible	<input checked="" type="checkbox"/>	= (Equal)	True
Region Position	<input checked="" type="checkbox"/>	= (Equal)	Fixed
Location Method	<input checked="" type="checkbox"/>	= (Equal)	Coordinates
Image Search Padding	<input checked="" type="checkbox"/>	= (Equal)	20, 15, 20, 15
Grayscale	<input checked="" type="checkbox"/>	= (Equal)	False
Font Name	<input checked="" type="checkbox"/>	= (Equal)	
End Y	<input checked="" type="checkbox"/>	= (Equal)	243
End X	<input checked="" type="checkbox"/>	= (Equal)	213
Enabled	<input checked="" type="checkbox"/>	= (Equal)	True
Element Snapshot	<input checked="" type="checkbox"/>	= (Equal)	75x20

Buttons: Add Element, Child, Clear, Highlight, Launch, OK, Cancel, Apply

- Native Messaging Host 는 Chrome, Edge 등 브라우저 타입별로 브라우저 기동과 동시에 한 개씩 기동.
- Application Modeler 가 Native Messaging Host를 통해 브라우저 extension과 통신을 하며, 브라우저 extension은 요청에 따라 해당 사이트를 구성하는 element 정보를 수집하여 응답을 전송함.

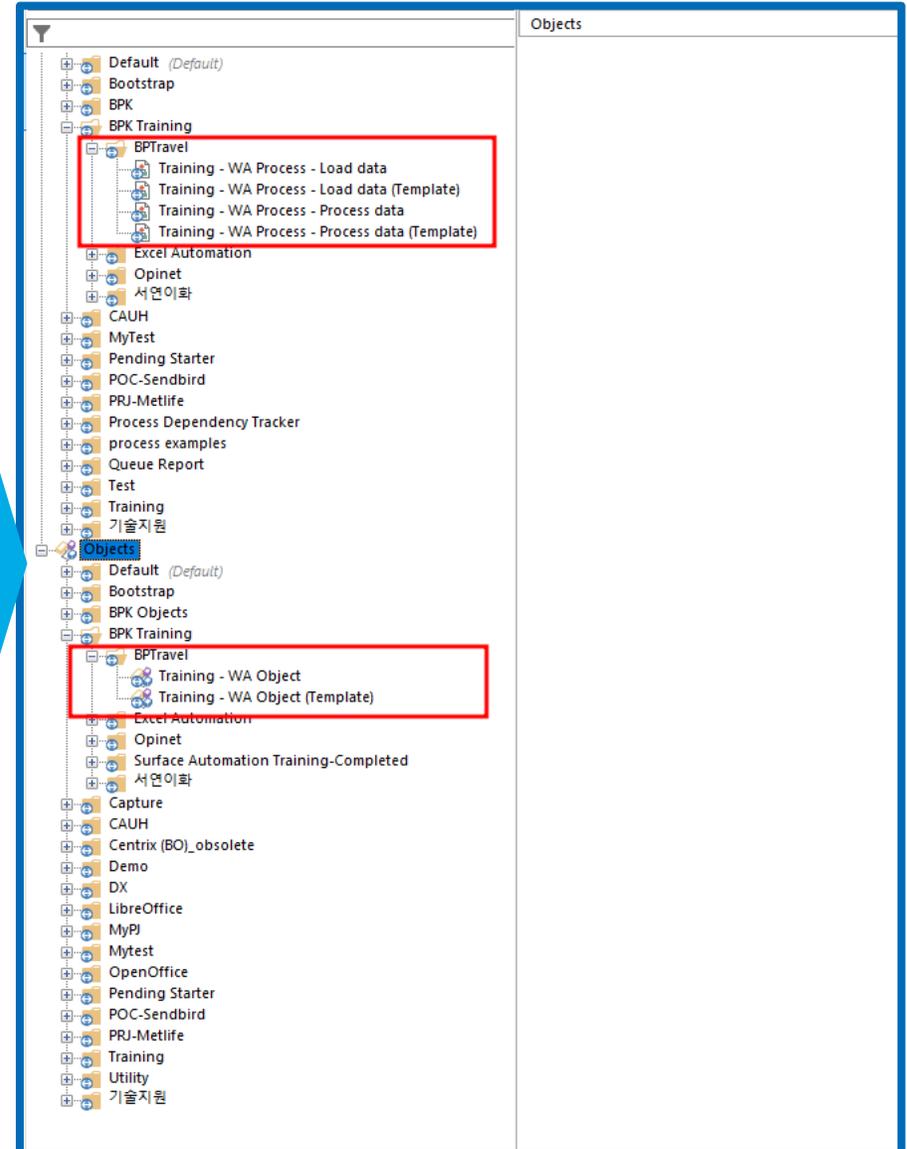
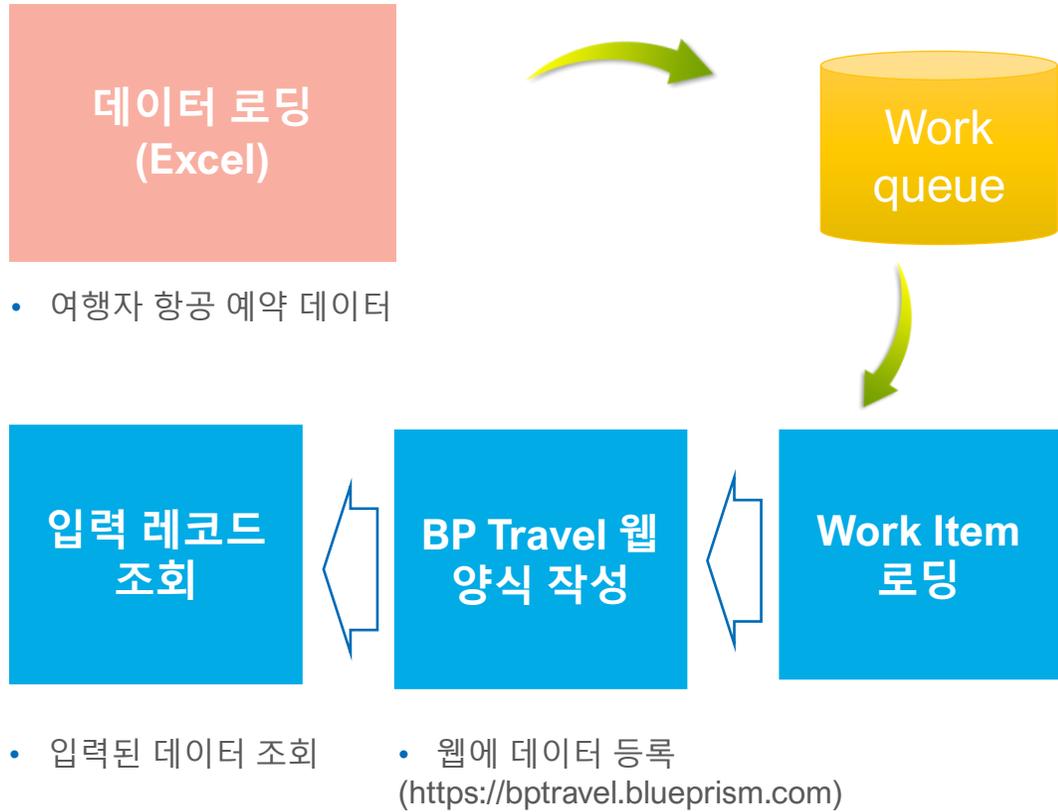


# 웹 어플리케이션 자동화

<https://bptravel.blueprism.com>

# 시나리오

“엑셀로 저장된 가상의 항공 예약 데이터를 읽어 웹의 폼에 맞게 작성 및 등록하고 확인”



# 프로세스, 오브젝트

Business Process

## Business Process #1

1. 엑셀의 파일을 열어서
2. Work Queue에 입력

## Business Process #2

1. Work Queue에 저장된 Work Item을 획득하여,
2. 레코드 단위로 웹에 등록.
3. 등록된 데이터에 대해 이름을 기준으로 검색
4. 입력 결과 확인



Business Object

### Excel connector

- 엑셀 인스턴스 생성
- 엑셀 파일 열기
- 워크시트의 값 로딩

[...]

### Work Queue connector

- WQ에 work Item 입력
- WQ로부터 work Item 획득

[...]

### BP Travel connector

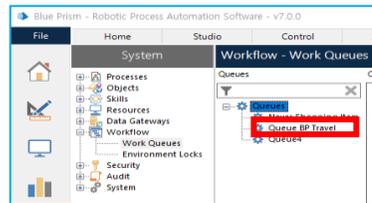
- 어플리케이션 모델링(웹 컴포넌트 식별, Dynamic path 인식)
- 모델링 방식 전환
- 브라우저 실행, 로그인
- 웹 양식 작성 및 상호작용 (값 입력, Button/Check box/Radio button, 링크 이동)



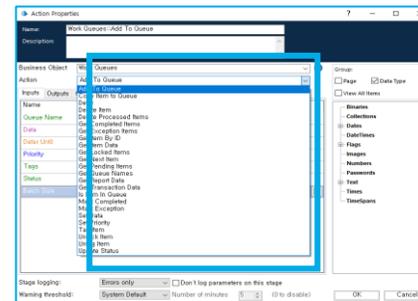
Applications



Excel



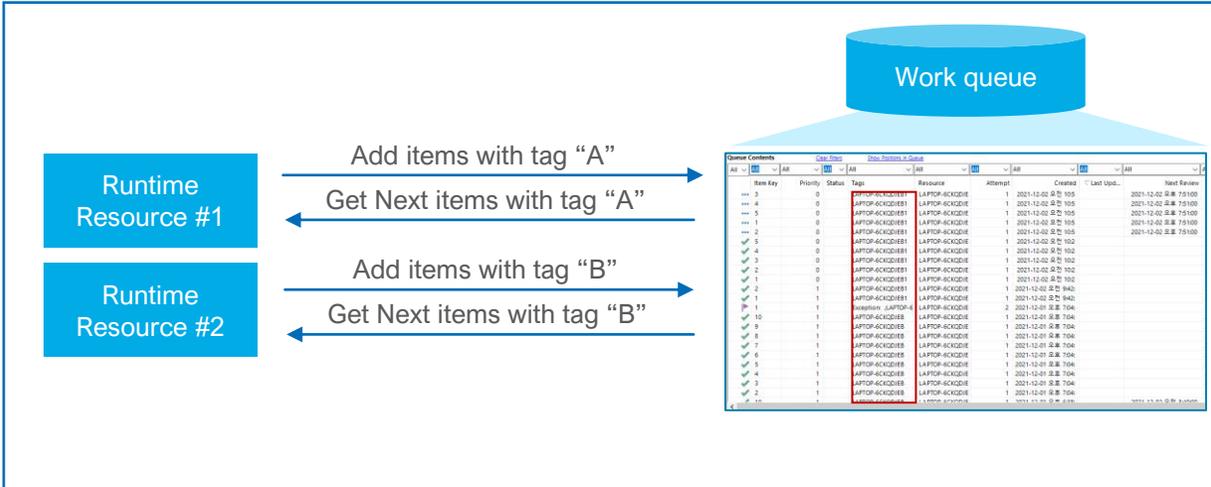
Work Queue



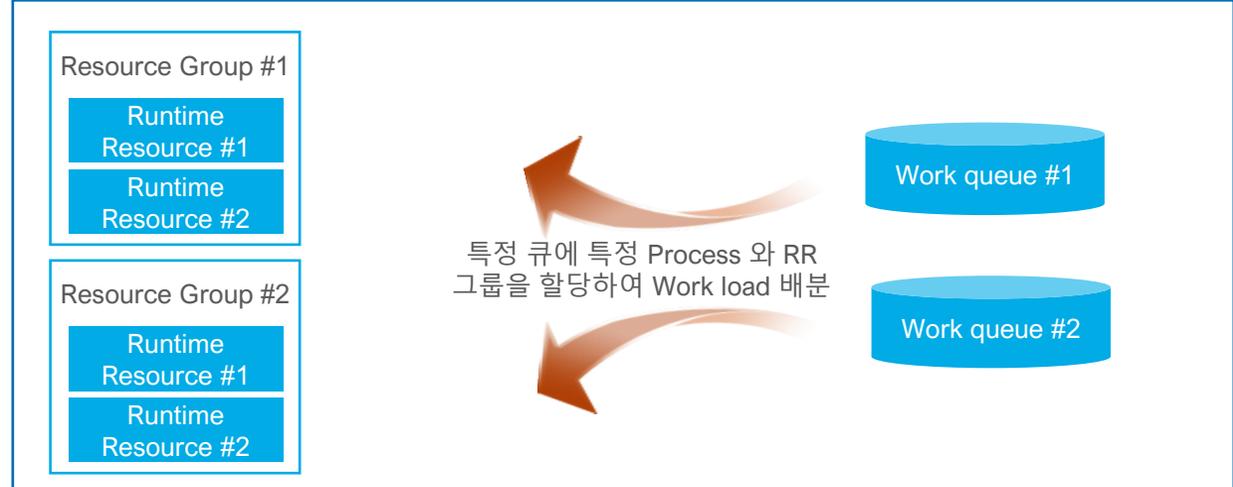
Browser  
(bluprism.bptravel.com)

# 워크 큐

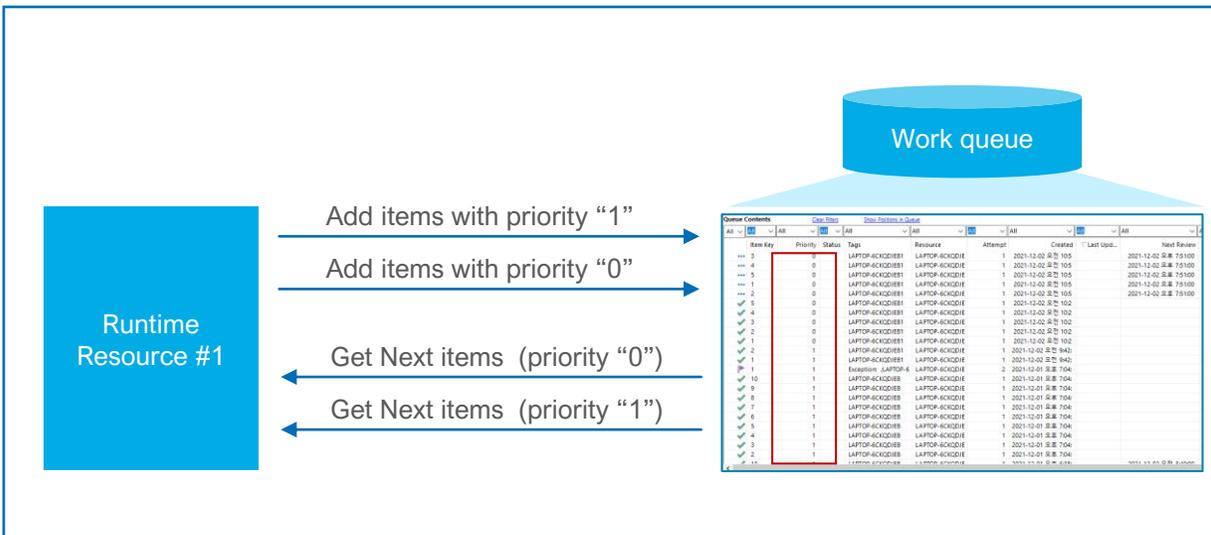
## Work Item Put/Get with Tag



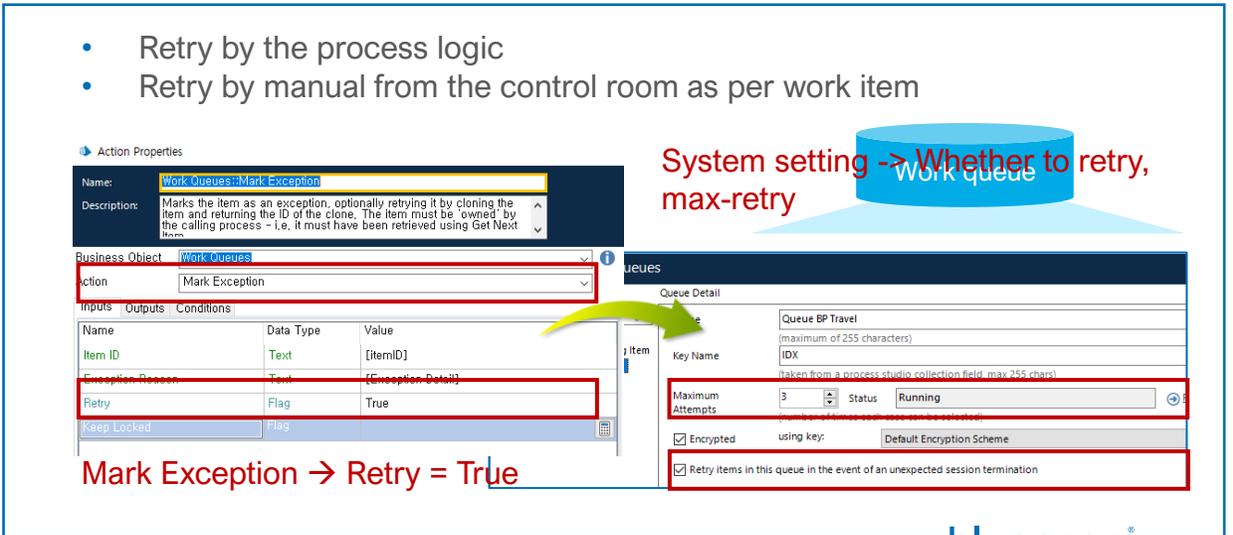
## Group based Work Item distribution

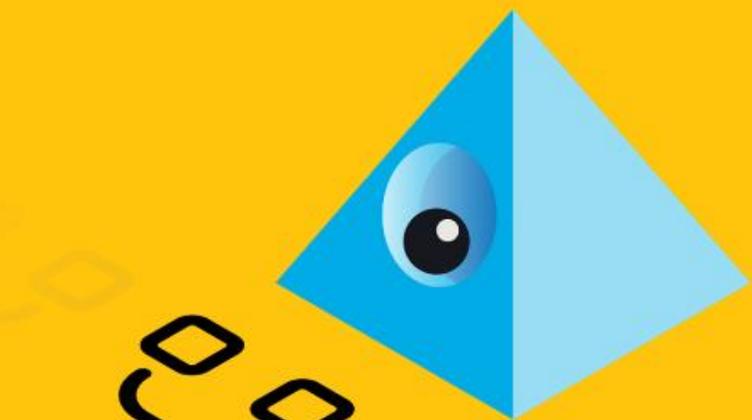


## Work Item Put/Get with Priority



## Exception Retry





## 실습 #1

BP Travel – Load Data 프로세스 제작

# 실습 #1-0 (1/2)

## Process #1: BP Travel – Load data

### <Preparation>

1. Blue Prism 스튜디오 로그인
2. Business Object 확인
  - MS Excel VBO
  - Internal Work Queue Object
3. Create Quote.xlsx 파일 특정 위치에 저장.

# 실습 #1-1 (2/2)

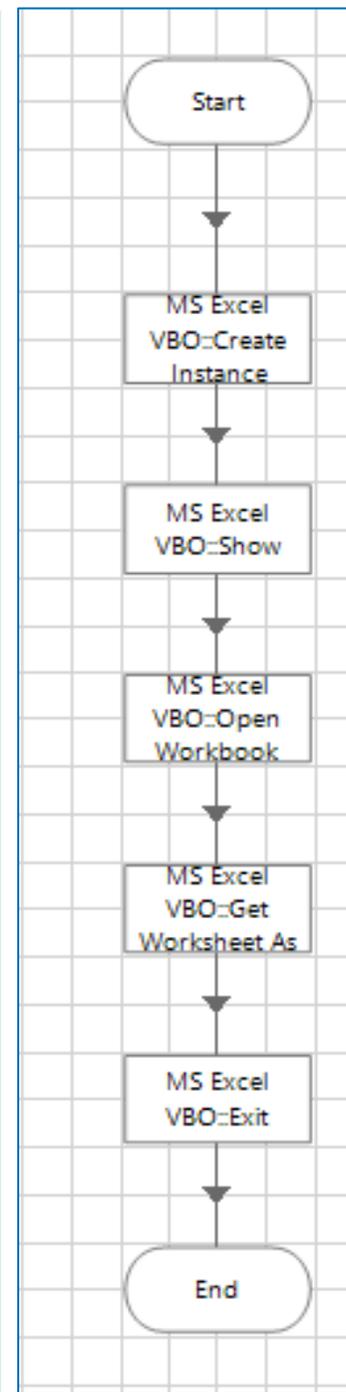
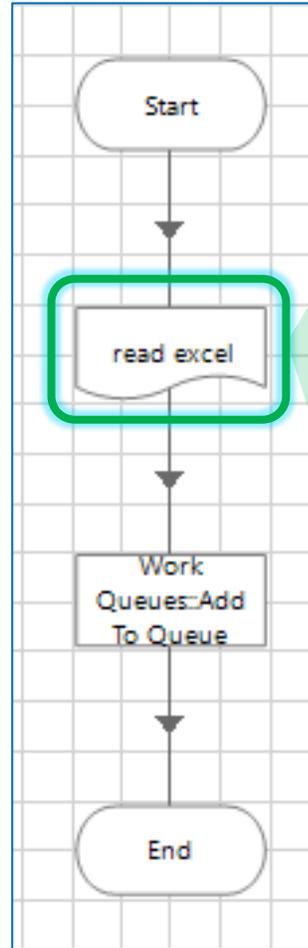
## Process #1: BP Travel – Load data

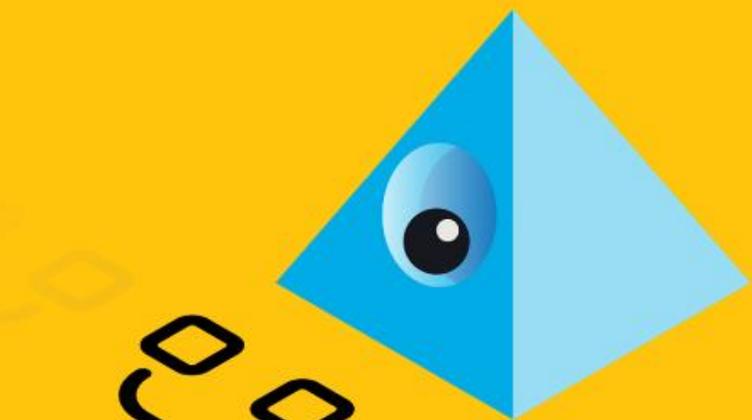
### <Data Loading>

1. Work Queue 생성 / 설정
2. 신규 Process #1 생성 (Load data)
3. 엑셀 파일 읽기
4. Work Queue에 데이터 로딩
5. 서브 페이지 작성/호출

### Exercise (3 min)

해당 프로세스를 실행한 후,  
Control room에서 신규 입력된  
Work Item을 확인





## 실습 #2

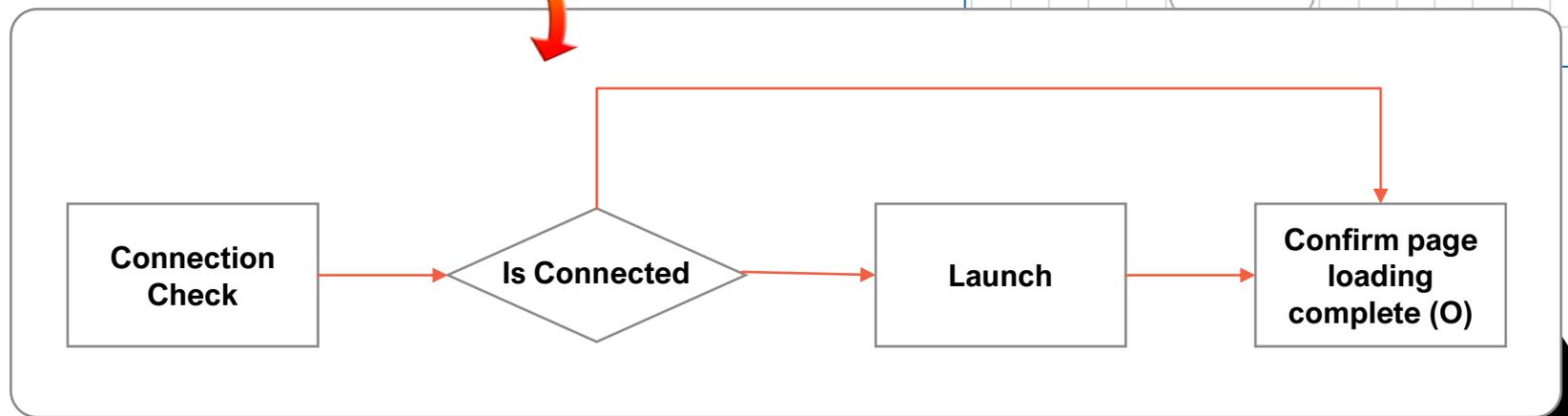
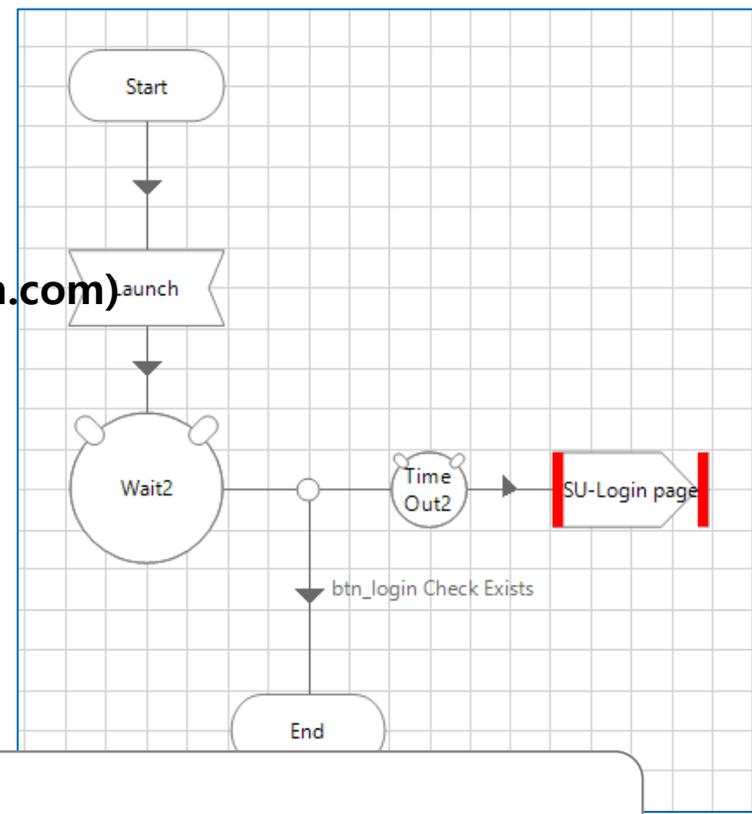
BP Travel – 오브젝트 제작

# 실습 #2-1

## Business Object: WA Object

### <Browser Launch (Launch page)>

1. 신규 Business Object 생성
2. 신규 Application Model 생성
3. Brower Launch (<https://bptravel.blueprism.com>)<sub>launch</sub>



### Take-away

- 신규 오브젝트와 Application Modeler 생성하기
- Launch vs Attach 이해하기

# 실습 #2-2

## Business Object: WA Object

### Take-away

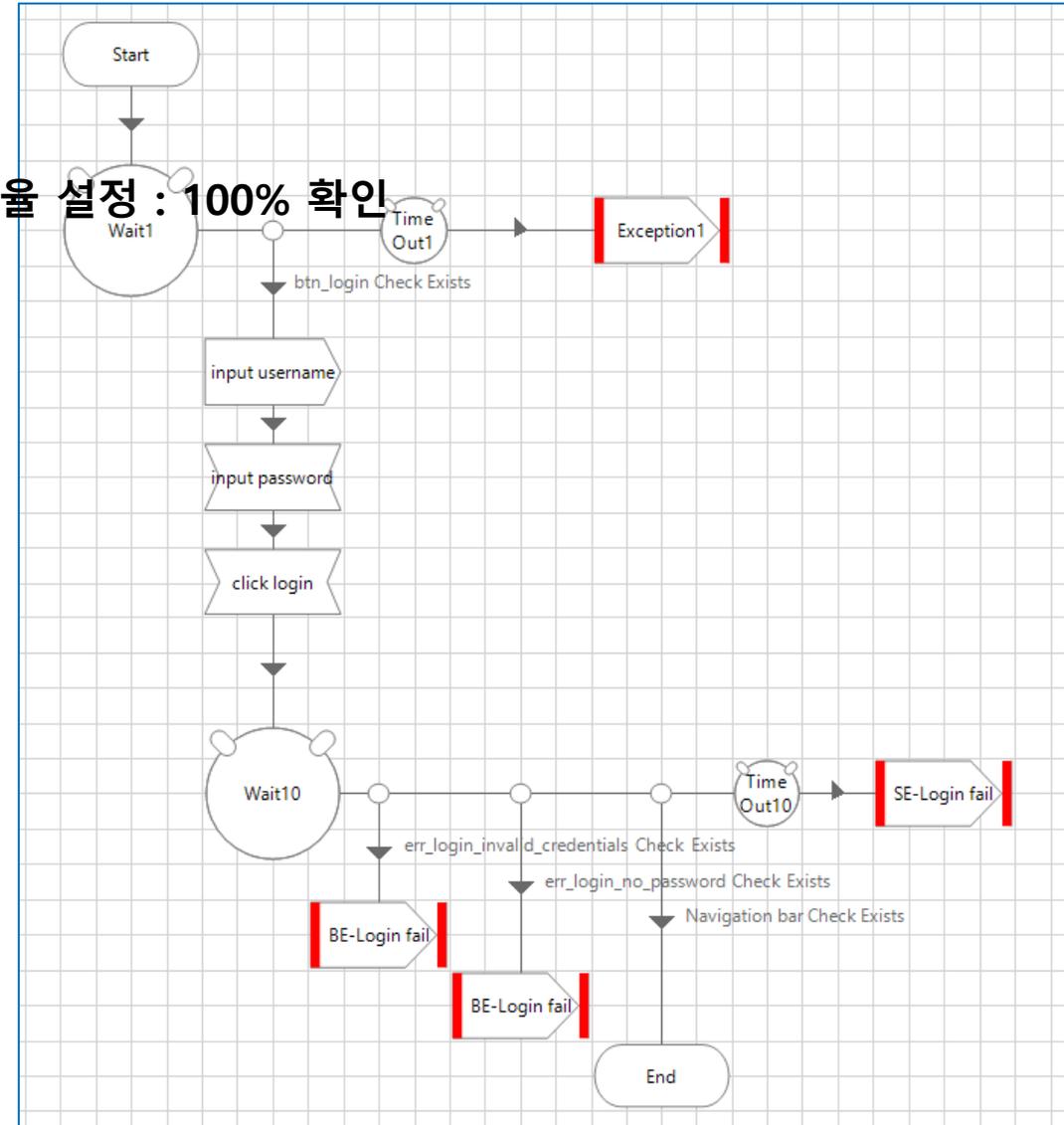
- Application Modeling 하기
- 화면에 데이터 입력하는 방법
  - Write
  - Global Send Keys

### <Preparation>

1. 디스플레이 설정 → 화면 배율 설정 : 100% 확인
2. Kill other browsers

### <Log-in (Login page)>

1. Application Modeling
  - 1) Input box
  - 2) Button
  - 3) Footer
  - 4) Close mark
  - 5) Error messages
2. Action stages
  - 1) Write stage
  - 2) Global Send Keys
  - 3) Wait stage



# 실습 #2-3

## Business Object: WA Object

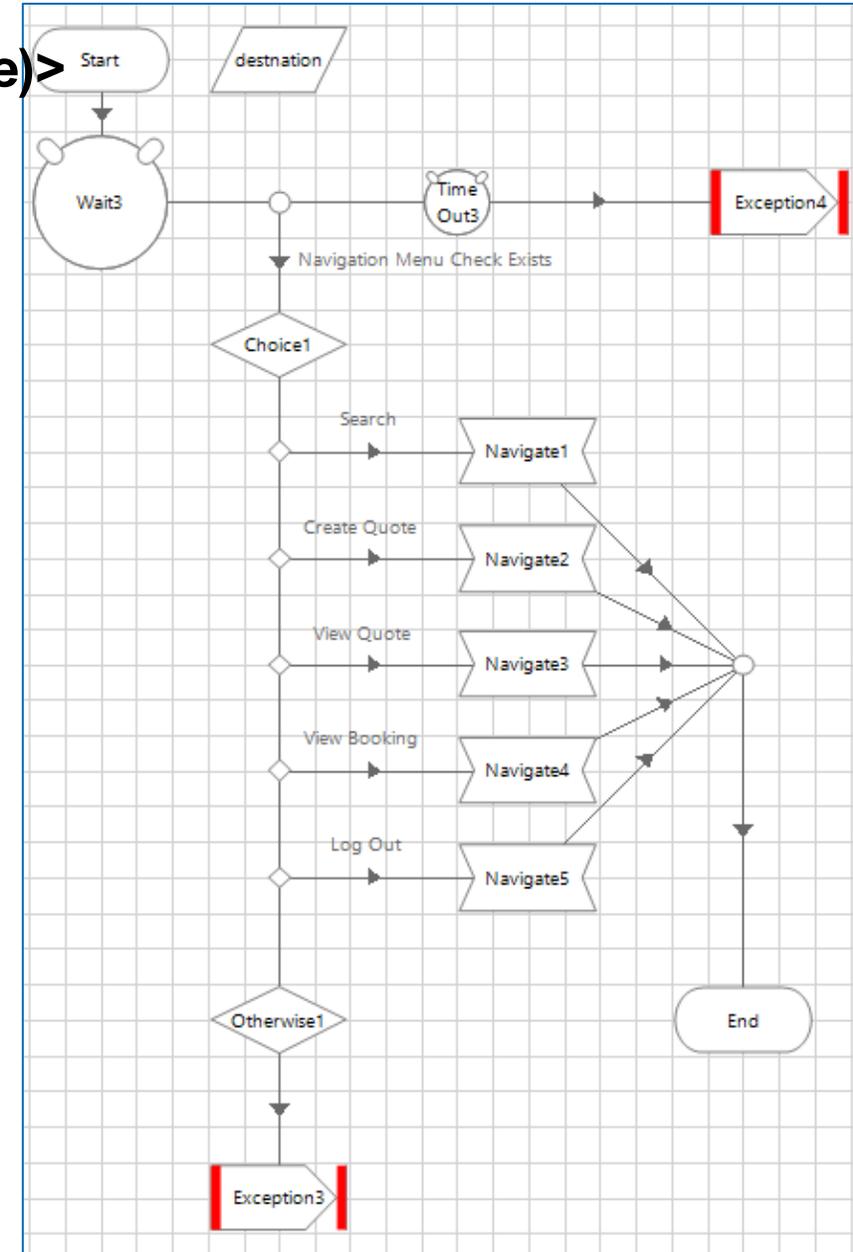
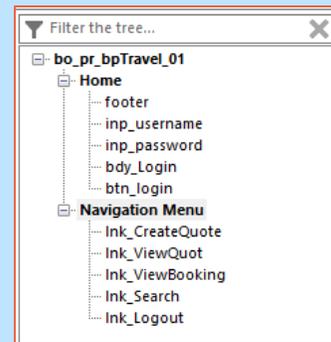
### <Navigation Menu (NavigateTo page)>

1. Application Modeling
  - 1) Navigation sidebar (div)
  - 2) Link (href)
2. Action stages
  - 1) Multiple choices

#### Exercise (3 min)

Application Modeler를 이용해 다음 링크를 인식하여 Modeler 등록

- Search
- Create Quote
- View Quote
- View Booking
- Log Out



#### Take-away

- Application Modeling 하기
- Multiple Choice 로직 이해하기

# 실습 #2-4 (1/3)

## Business Object: WA Object

### <Create Quote (1/3)>

#### 1. Application Modeling

- 1) Input box
- 2) Dropdown list
- 3) Check box
- 4) Button

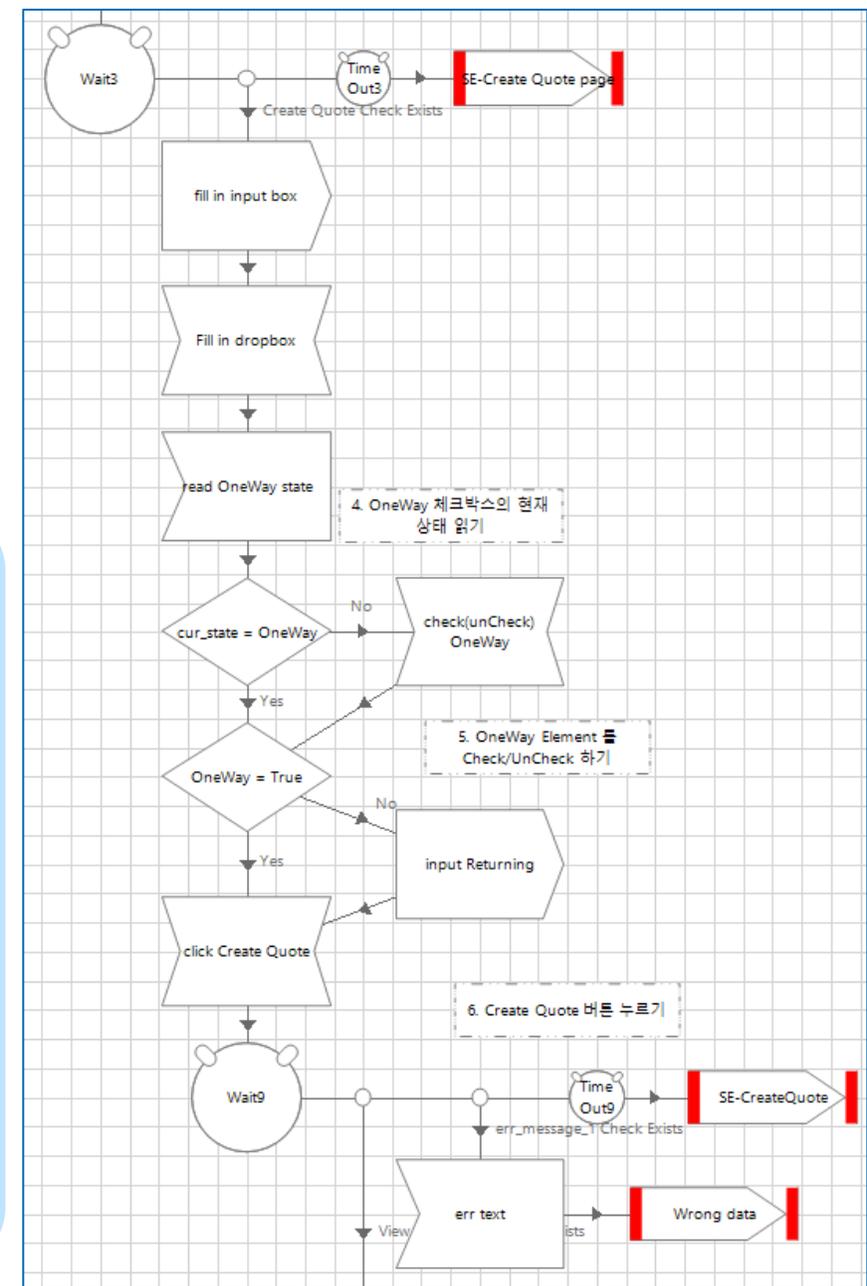
#### Exercise (5min)

Application Modeler를 이용해 웹 페이지의 모든 컴포넌트 인식 및 등록

The image shows a web form on the left and its corresponding Application Modeler component tree on the right. The form includes fields for From, To, Departing, One Way (checkbox), Returning, Adults, Children, Name, Postcode, Telephone, and Email, along with a 'Create Quote' button. The component tree lists various elements like Navigation bar, Search, Login, Create Quote (with sub-elements like drp\_From, inp\_Departing, etc.), and View Booking page.

#### Take-away

- 다양한 타입의 Web element 인식하기



# 실습 #2-4 (2/3)

## Business Object: WA Object

### <Create Quote (2/3)>

1. 웹 양식 채우기
  - 1) Input box
  - 2) Drop box (Combo)
  - 3) Check box

NOTE 날짜 포맷 변경:  
FormatDate([date], "dd/MM/yyyy")

2. Wait stage
3. Decision stage
4. Wait stage

#### <Initial value for testing>

- From: Albania - Tirana (TIA)
- To: Andorra - Andorra (ALV)
- Departing: 2023-01-30
- Returning: 2023-02-20
- One Way: False
- Adults: 2
- Children: 1
- Name: Passenger
- Postcode: LL26 6CM
- Telephone: 821012341234
- Email: abc@google.com

### Exercise (5 min)

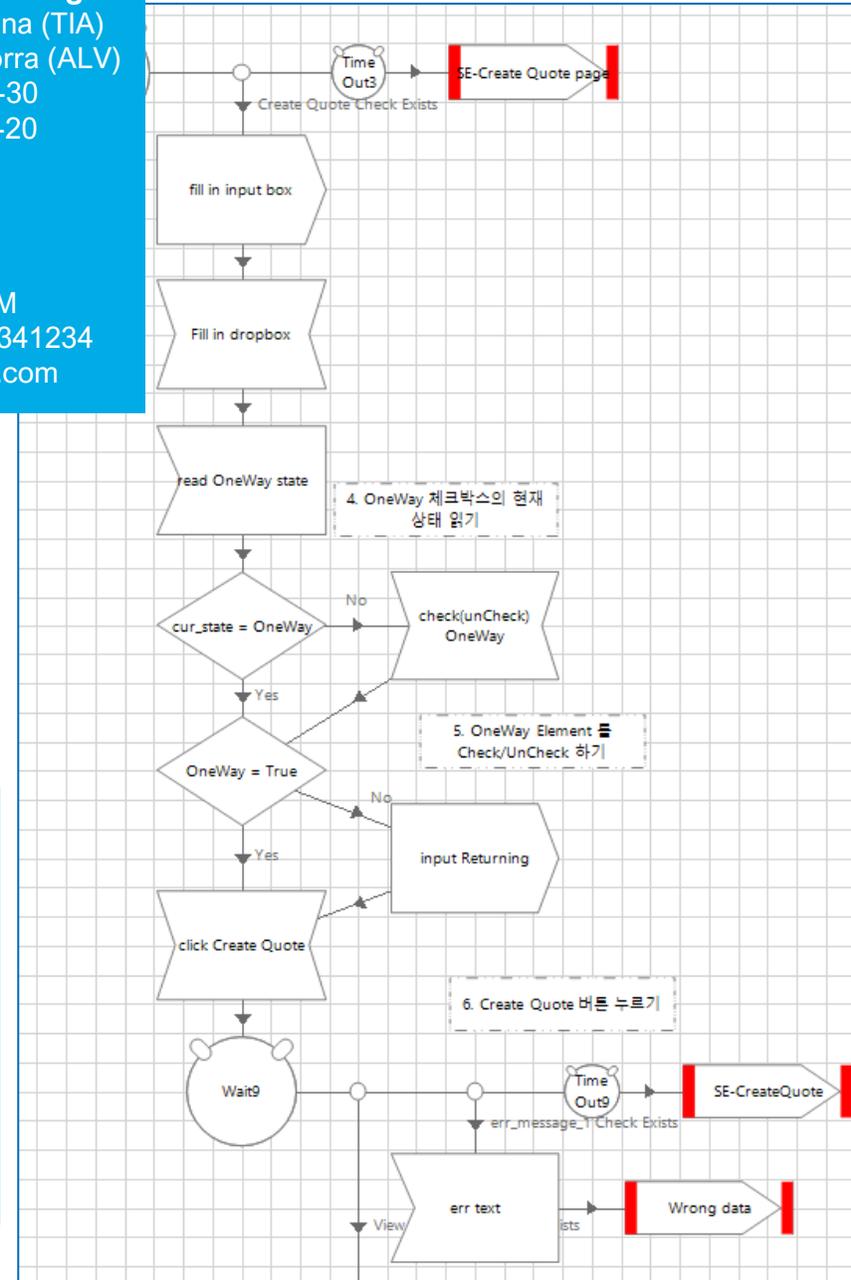
Input box, Drop box, Checkbox를 활용하여  
웹 양식 채우기

: To, One Way, Returning, Adults, Children,  
Name, Postcode, Telephone, Email 등

- 항목별 변수 생성하고 초기값 설정하여 시험
- One-Way 값에 따라 Returning 항목을 넣을 지 말지 고려
- 예외처리 고려

### Take-away

- 다양한 타입의 Web element 값 입력하기
- Ready-made 함수 이용하기



# 실습 #2-4 (3/3)

## Business Object: WA Object

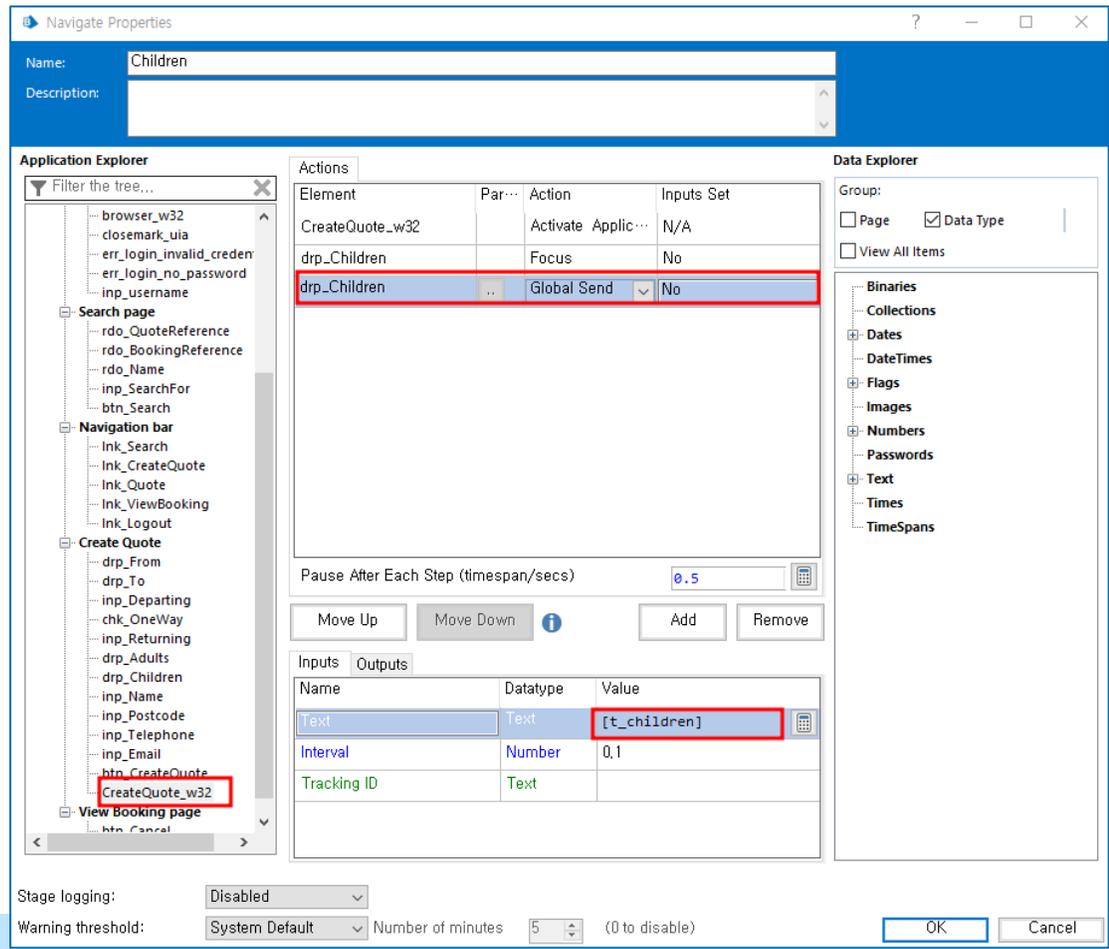
### Take-away

- Drop-box 값 입력하기

## <Create Quote (3/3)>

### 1. Drop Box (Alternative)

Drop box 입력이 Select Item action으로 해결이 되지 않는 경우, Global Send Keys action을 이용



### Exercise (5 min)

Global Send Keys를 이용해 Create Quote 페이지의 Children box 의 값을 입력

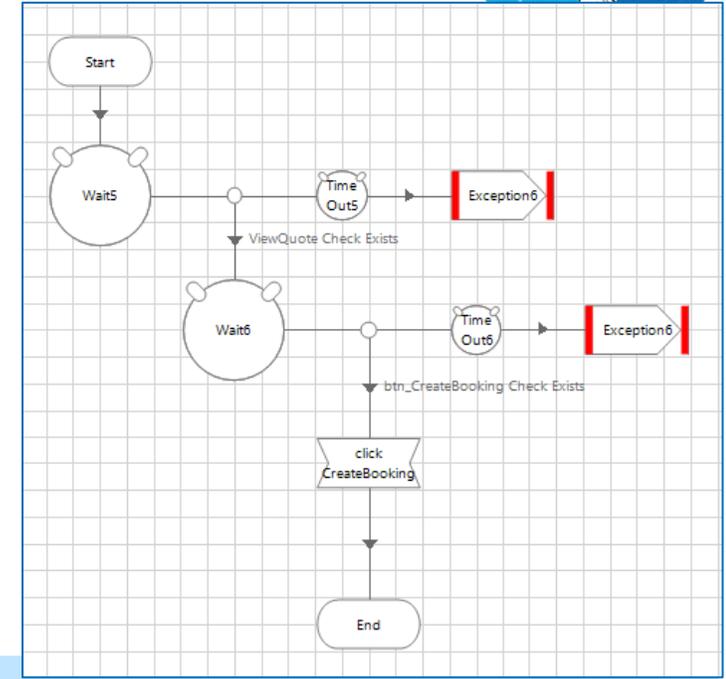


# 실습 #2-5

## Business Object: WA Object

### <View Quote >

1. Application Modeling
2. Action stages
  - 1) Navigate – Button click

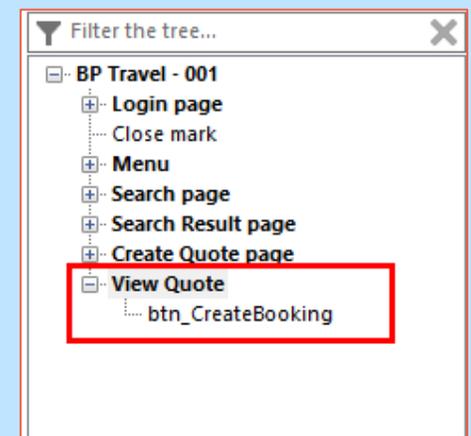


### Exercise (1 min)

해당 페이지에서 Create Booking 버튼을 눌러 레코드 등록

Quote Reference	20001
From	Albania - Tirana (TIA)
To	Andorra - Andorra (ALV)
Departing	15/01/2022
Returning	One-way
Adults	2
Children	1
Total	166.00
Name	최홍주
Postcode	LL26 6CM
Telephone	821012341234
Email	abc@google.com
<input type="button" value="Cancel Quote"/> <input type="button" value="Create Booking"/>	

Version 1.0





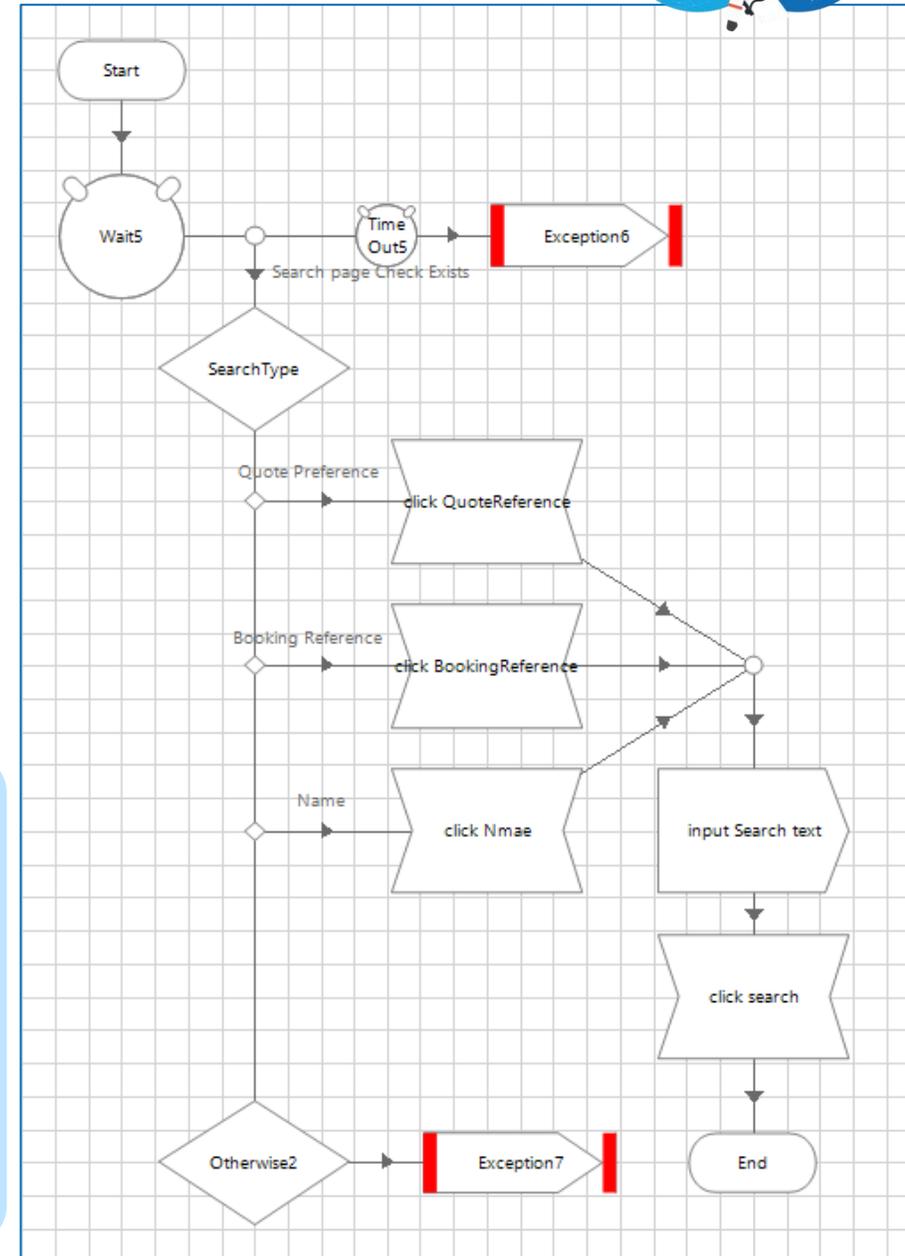
# 실습 #2-6

## Business Object: WA Object

### <Search>

1. Application Modeling
2. Action stages
  - 1) Wait stage
  - 2) Multiple choice stage
  - 3) Write stage
  - 4) Navigate Stage

- Exercise (5 min)
  - Search page를 구성하는 Radio, Input box, button을 Application Modeler를 이용하여 인식.
  - Search Type에 따라 해당 Search Radio를 선택하고 Search Text를 입력
  - Search Button 클릭





# 실습 #2-7 (1/3)

## Business Object: WA Object

### Take-away

- 테이블 값 읽어오기
- Loop Stage 이용하기

## <Search Results>

### 1. Application Modeling

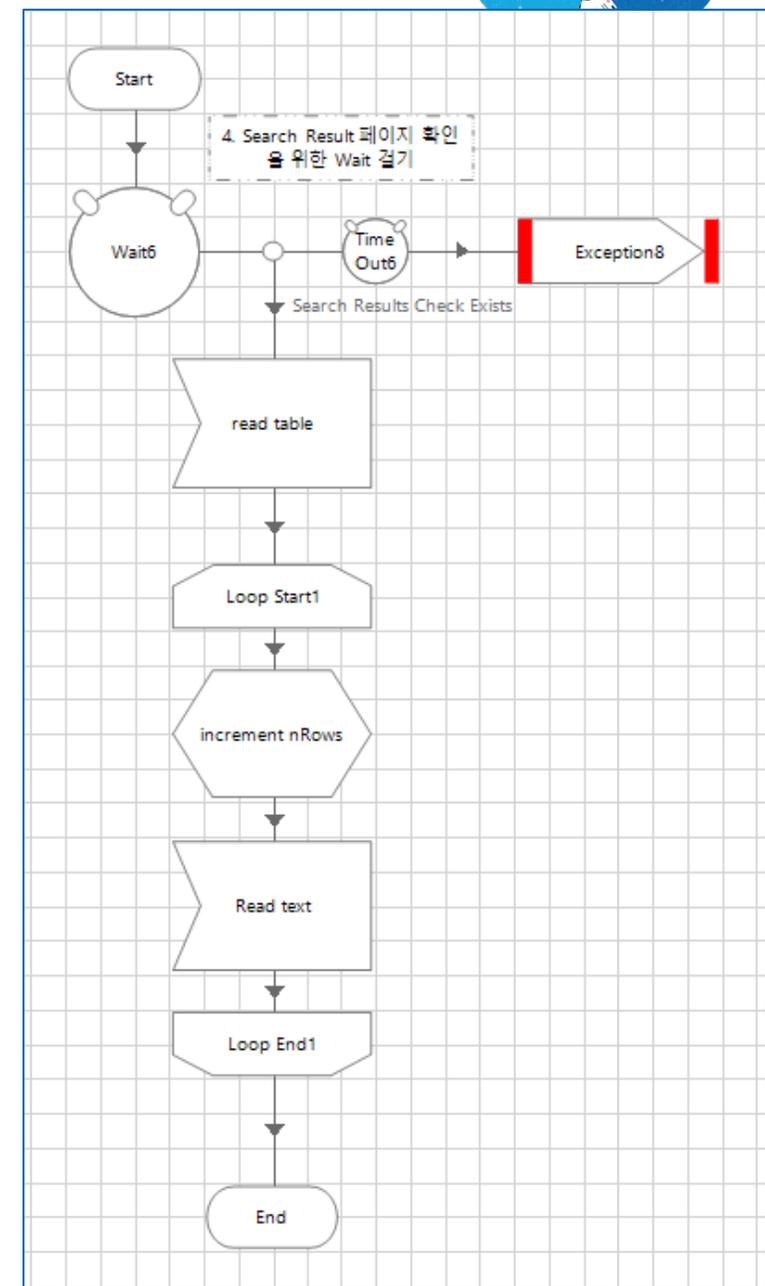
- 1) Table
- 2) Dynamic path (Path/Xpath)

Please select one of the search results below

Reference	Name	From	To
Q 10001	Sidney Nazzario	Bordeaux (BOD)	Bologna (BLQ)
B 10002	Sue Harg	Dortmund (DTM)	Gothenburg (GOT)
Q 10003	Paul Greenwood	Dublin (DUB)	Nice (NCE)
B 10004	Melanie Emir	Paris (CDG)	Liverpool (LPL)
Q 10005	Don Fredricson	Graz (GRZ)	Madrid (MAD)
B 10006	Anne Sunder	Brescia (VBS)	Ghent (GNE)
Q 10007	Paul Davis	Paris (ORY)	Malmo (MMA)
B 10008	Anne Popov	Copenhagen (CPH)	Vilnius (VNO)

### 2. Action stages

- 1) Read
- 2) Loop w/ Collection data
- 3) Calculation





# 실습 #2-7 (2/3)

## Business Object: WA Object

### Take-away

- Application Modeler의 Attribute 값 정하기

## <Search Results>

1. Application Modeling – Table spying (Alternative)

TABLE 인식이 잘 안되는 경우, Xpath와 Web Element Type를 직접 입력

NOTE  
Xpath값은 브라우저의 <검사> 기능을 이용하여 확인 가능

Application Modeler interface showing the configuration for a table element named `tbl_SearchResult`. The element type is set to `Table (Web)` and the data type is `Text`.

The **Attributes** table is as follows:

Name	Mat...	Match Type	Value
Web Path/XPath	<input checked="" type="checkbox"/>	= (Equal)	/HTML[1]/BODY[1]/DIV[1]/DIV[3]/DIV[1]/TABLE[1]
Web Page Address	<input checked="" type="checkbox"/>	= (Equal)	https://bptravel.blueprism.com/results.html
Web Element Type	<input checked="" type="checkbox"/>	= (Equal)	TABLE
Web Y	<input type="checkbox"/>	= (Equal)	153
Web X	<input type="checkbox"/>	= (Equal)	251
Web Width	<input type="checkbox"/>	= (Equal)	510
Web Value	<input type="checkbox"/>	= (Equal)	
Web Text	<input type="checkbox"/>	= (Equal)	PassengerAlbania - Tirana (TIA)Andorra - Andorra (A... PaccannerAlbania - Tirana (TIA)Andorra - Andorra (A...
Web Target Address	<input type="checkbox"/>	= (Equal)	
Web Tab Index	<input type="checkbox"/>	= (Equal)	-1
Web Style	<input type="checkbox"/>	= (Equal)	{ "accentColor":"","additiveSymbols":"","alignContent...
Web Source	<input type="checkbox"/>	= (Equal)	
Web Scroll Y	<input type="checkbox"/>	= (Equal)	0
Web Scroll X	<input type="checkbox"/>	= (Equal)	0
Web Scroll Width	<input type="checkbox"/>	= (Equal)	509
Web Scroll Height	<input type="checkbox"/>	= (Equal)	80



# 실습 #2-7 (3/3)

## Business Object: WA Object

### <Search Results>

#### 1. Application Modeling – Dynamic type

- 일정한 패턴으로 반복되는 Element의 XPath를 dynamic으로 설정

Web Path/XPath	<input checked="" type="checkbox"/> Dynamic	/HTML[1]/BODY[1]/DIV[1]/DIV[3]/DIV[1]/TABLE[1]/TBODY[1]/TR[2]/TD...
----------------	---------------------------------------------	---------------------------------------------------------------------



- 변경되는 부분을 '변수'로 정의하여 수식화

The screenshot shows the 'Reader Properties' window with the 'Application Explorer' on the left. The 'Search Results' folder is expanded, showing 'lik\_Column1'. The 'Application Element Parameters' dialog is open, showing the 'Web Path/XPath' parameter being set to a dynamic expression. The 'Expression Chooser' dialog is also open, showing the XPath expression: `"/HTML[1]/BODY[1]/DIV[1]/DIV[3]/DIV[1]/TABLE[1]/TBODY[1]/TR[1]/INPUT[1]"`. The 'Data Explorer' on the right shows the 'Data Type' set to 'Text'.

### Take-away

- Dynamic 타입 이해하기
- Xpath 이해하기



# 실습 #2-8

## Business Object: WA Object

### Take-away

- 다양한 Spying 방법 이해하기

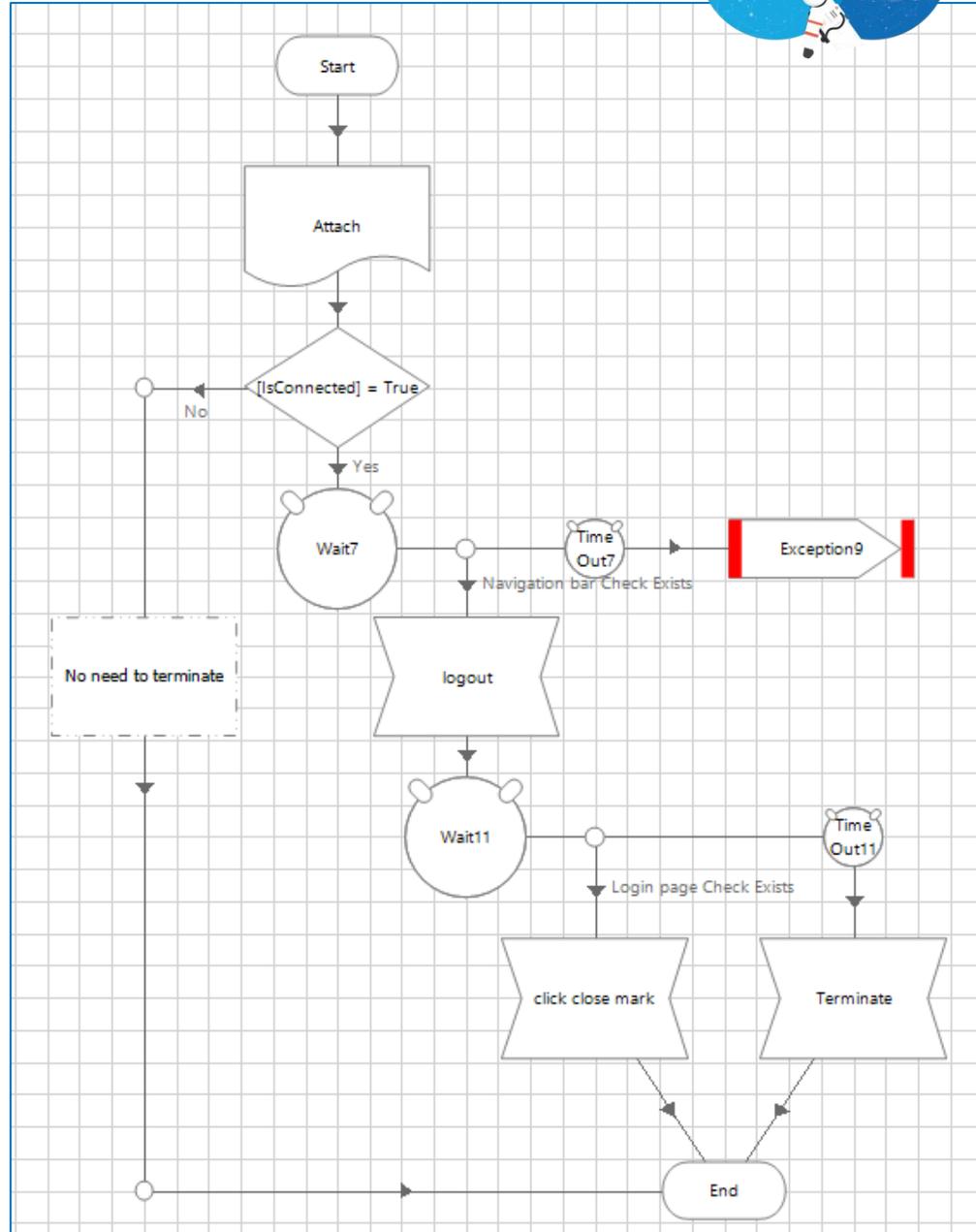
### <Close down>

1. Application Modeling
  - 1) Close mark (UIAutomation)
2. Action stages
  - 1) Navigation – Button click

**Exercise (5 min)**

Application Modeler 의  
UIAutomation 을 이용하여 브라우저  
close mark 모델링

Log-out & close browser 만들기





## 실습 #3

BP Travel – Process Data 프로세스 제작



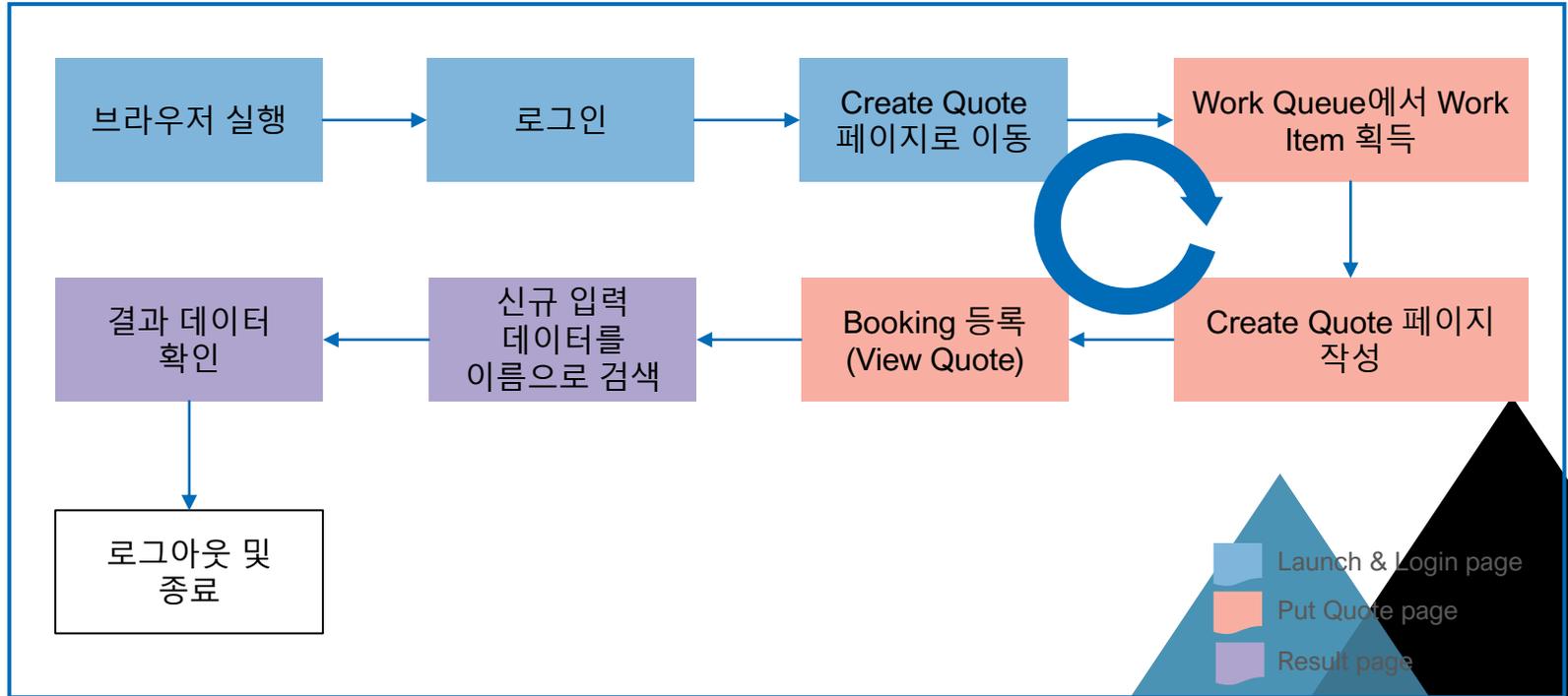
# 실습 #3-0

## BP Travel – process data

### <Preparation>

1. Business Object Publication 하기
2. Process 에서 새로 만든 Business Object가 보이는 지 확인

### <Process #2 workflow>



### Take-away

- 오브젝트 호출방법 이해하기
- 프로세스 로직 구성하기



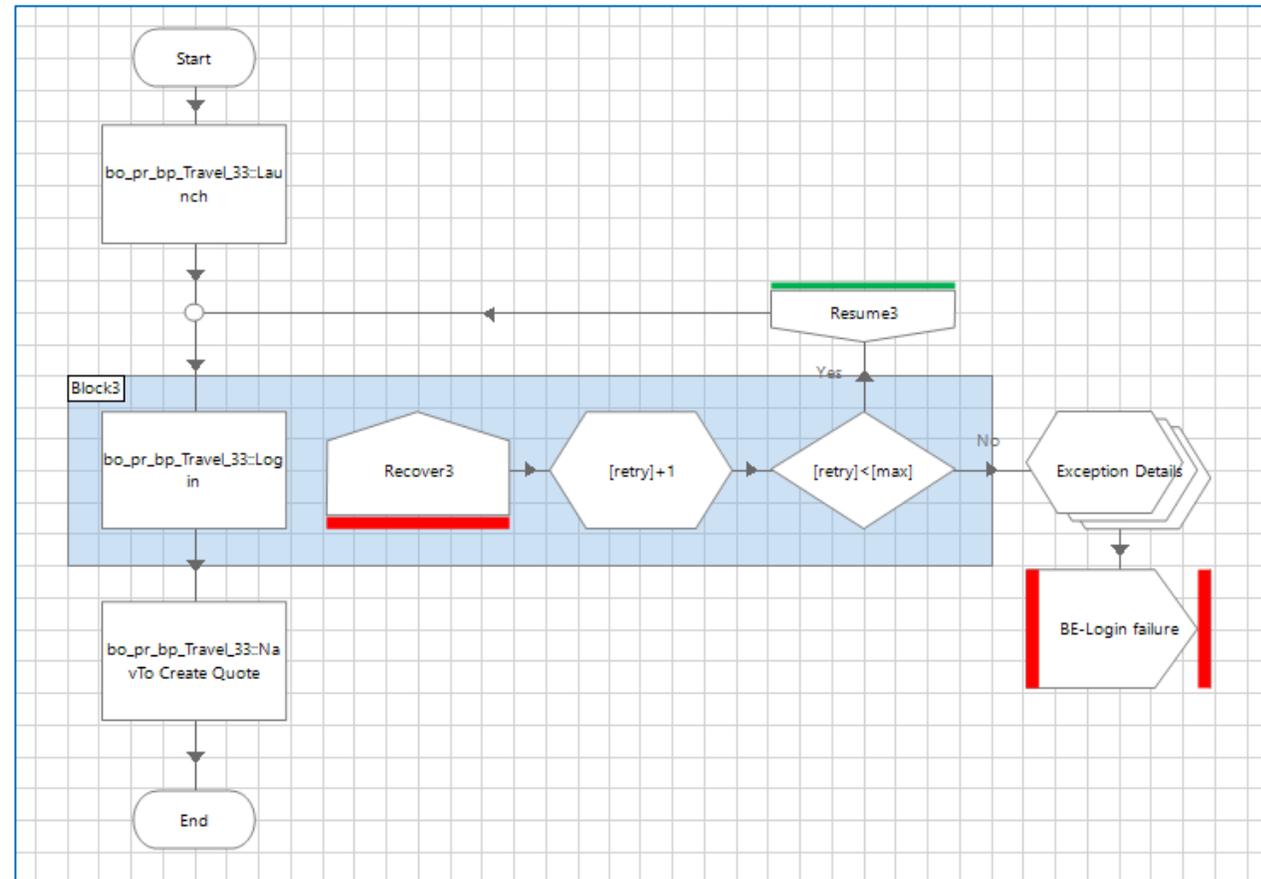
# 실습 #3-1

## BP Travel – process data

### <Launch & Login>

#### 1. Launch & Login 페이지 작성

- Browser Launch -> Login -> Create Quote 페이지로 이동
- Process <-> Business Object 매개변수 전달



#### Take-away

- 예외처리 방법 이해하기 (Exception, Recover/Resume)
- Bubble-up 개념 이해하기

# 실습 #3-2

## BP Travel – process data

### Take-away

- Work Queue 아이템 값 가져오기
- Work Queue 아이템 처리하기

### <Put Quote>

#### 1. Put Quote 페이지 작성

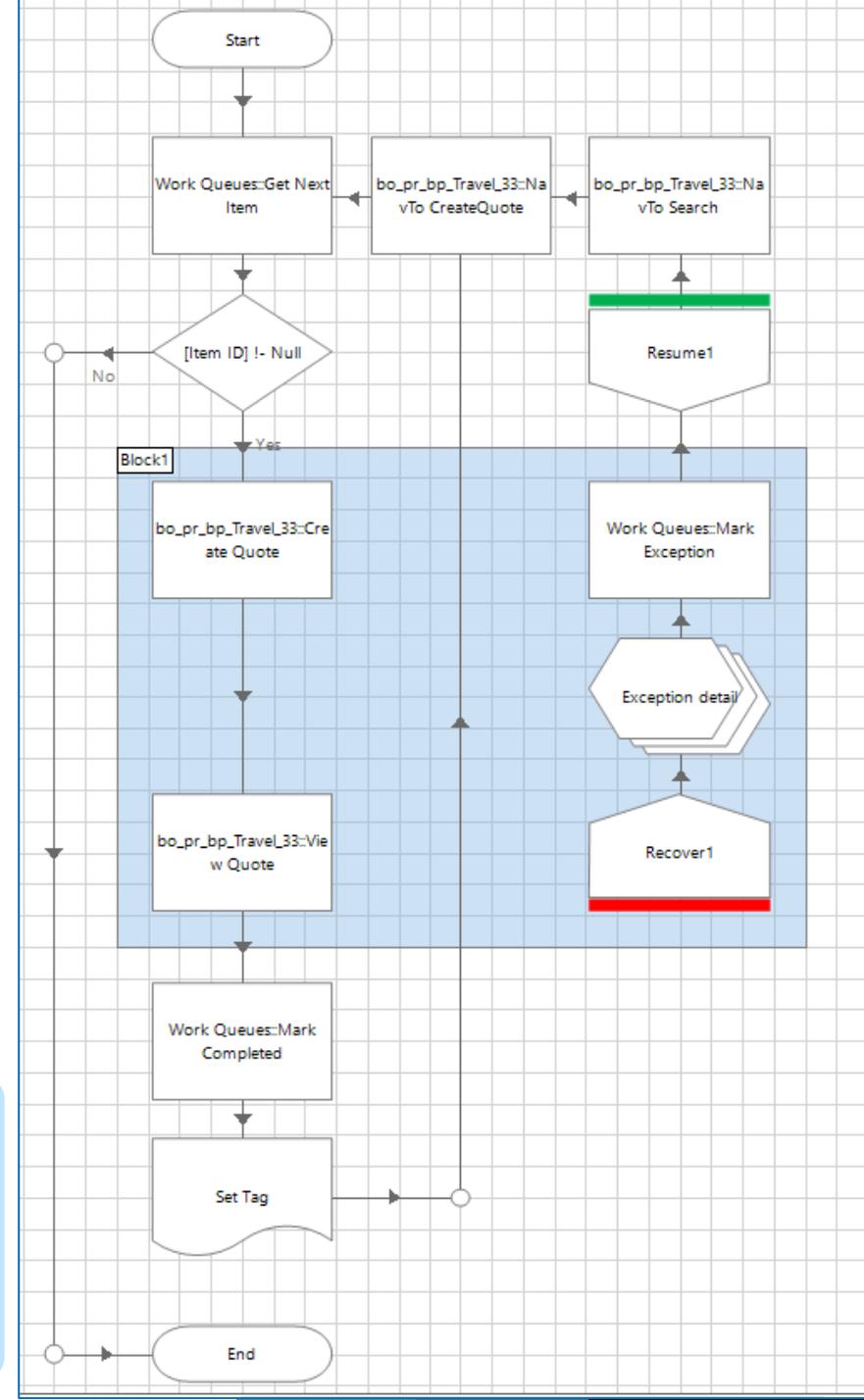
- Work Queue 아이템 획득 (Get Next Item)
- 획득한 아이템을 Business Object의 웹 양식 작성 Action에 매개변수로 전달
- 완료된 Work Item 에 Complete/Exception 처리

#### 2. 예외 처리

- Recovery – Resume
- ExceptionType(), ExceptionDetail()

### Exercise (3 min)

WQ에서 Work Item을 순차적으로 획득하고, 처리 완료된 Work Item에 Marking 하기 (예외처리 포함)

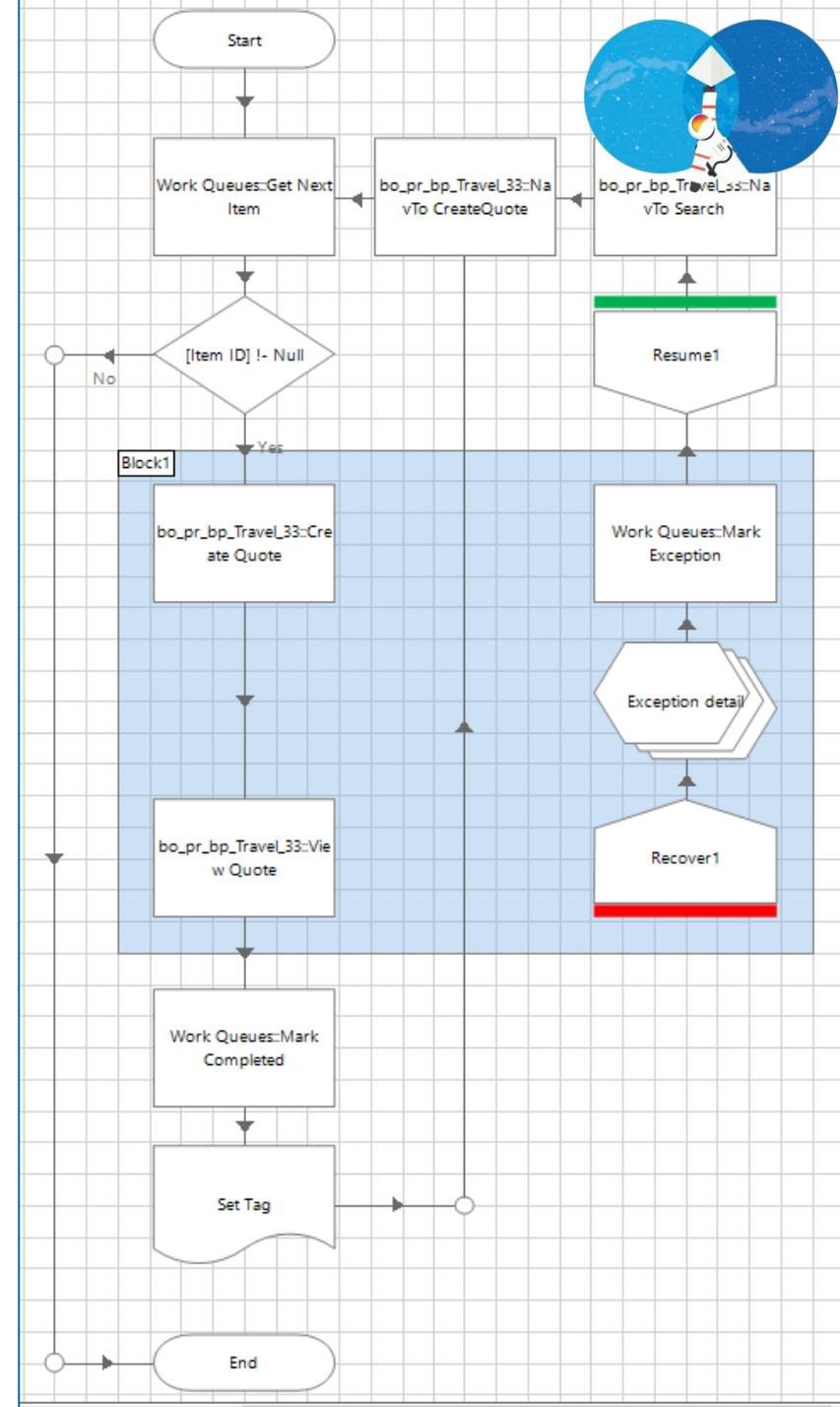


# 실습 #3-3

## BP Travel – process data

### <Set Tag>

1. Set Tag 페이지
  - WQ 태깅 방식 이해하기
  - WQ 태깅 활용하기
2. Tag 값 설정 시 주의사항





## 실습 #3-4

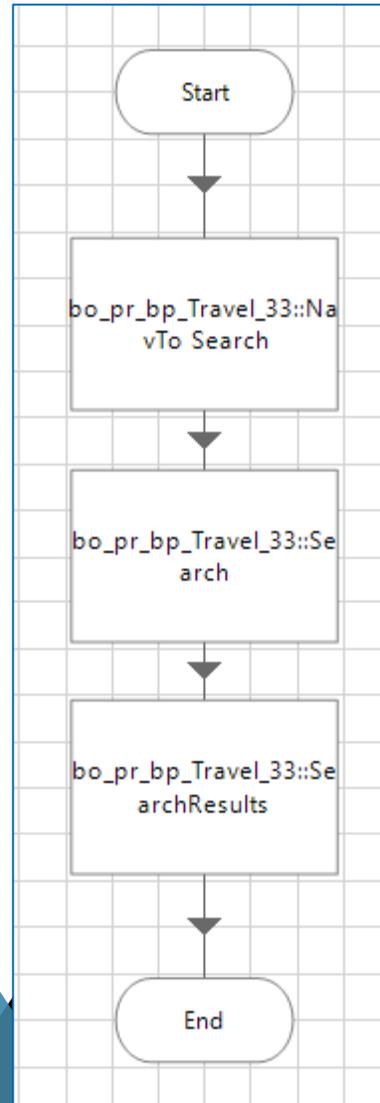
### BP Travel – process data

#### <Result>

1. Search page 작성 및 Search 결과 리턴
  - Business Object 연결
  - Process <-> Business Object 매개변수 전달
  - 검색결과 테이블 획득

#### Exercise (3 min).

- 1) Search page로 이동
- 2) Search Type 과 Search Text를 입력하여 Search 수행
- 3) 수행 결과를 main page로 리턴

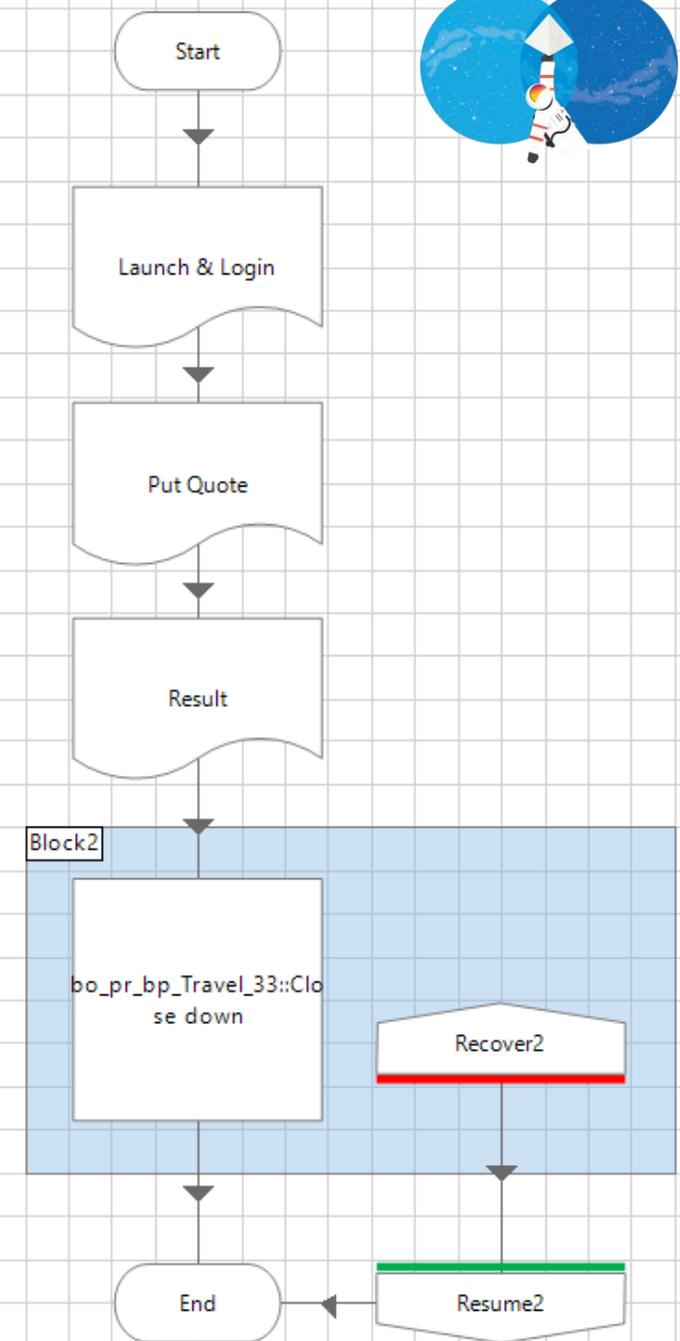


# 실습 #3-5

## BP Travel – process data

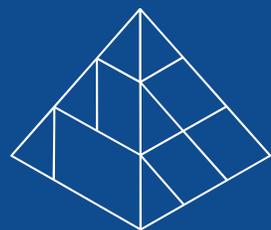
### <Close down>

1. Log out
2. Browser Close



# Summary

- 자동화 업무 설계 시 모듈화할 수 있는 기능을 확인하고 오브젝트로 개발하여 자산화
- 업무 형태에 따라 워크큐를 활용하여 동적인 프로세스 구조 설계
- Web element를 인식하는 다양한 스파잉(spying) 방법을 숙지하고 브라우저 모드 외 다양한 방법을 이용하여 어플리케이션 모델링
- 프로세스와 오브젝트, 오브젝트와 오브젝트간 매개변수 전달 방식 이해



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