

2020 Software V&V

【 [A2] 1st Testing Report 】

Team #1

201411273 박재범

201411295 이상훈

201510436 허윤아

201511244 김민우

Contents

1. Specification Review

2. System Testing

1. [A2] Specification Review

Stage	Page	Review
1000	-	Define Requirement가 없다.
1001	7	직관적 디자인이란 무엇이며 이를 어떻게 소프트웨어에 반영하였는가?
1009	30	Test Case 설명에서 입력에 따른 기대 결과가 명시되어 있지 않음.
2033	32	Define System Sequence Diagram에서 어떤 건 System이고 어떤 건 Controller. 통일 요구.
2039	57	Traceability Analysis에 Requirement가 아예 없다.
2047	78	Traceability Analysis에 Requirement가 아예 없다.
2044	76	Class diagram에 몇몇 attribute가 public으로 표현되어있는데 private으로 바뀌야 한다.
2041	28	Use Case 25. Set Indicate Mode에서 모드를 해제하면 모드의 데이터는 저장 되는지 초기화 되는지 명시하지 않음.
2041	15	Use Case 12. Record Lap Time에서 스톱위치 랩타임이 어디에 어떻게 표시되는지 명시하지 않음.
2041	16	Use Case 13. Set Alarm에서 알람 초기값이 어떻게 되어있는지 명시하지 않음.
2041	16	Use Case 13. Set Alarm에서 알람 시간은 AM/PM 표기인지 24시 표기인지 명시하지 않음. 그에 따른 수정 한계값 명시 필요.
2041	21	Use Case 18. Change World Time에서 "마지막 순번"이 어떤 나라이고 "처음"이 어떤 나라인지 설명 필요.
2041	22	Use Case 19. Set Time Zone의 Pre-requisites에서 "TimeKeeping mode에서 표시하고자 하는 World Time이 선택되어 있어야 한다." 라고 설명했는데, 상세 설명 필요.
2041	23	Use Case 20. Input Price에서 Exceptional Courses of Events의 항목들, 무 값 정상범위가 어떻게 무 값의 일정 개수가 어느 정도이고 무 값에 대한 예측값이 어떤 경우 존재하지 않는지에 대한 상세 명시 필요.
2041	27	Use Case 24. Mode Switch에서 모드가 바뀌는 순서가 어떻게 정해지는지 상세 명시 필요.
2041	28	Use Case 25. Set Indicate Mode에서 모드가 선택된 순간부터 활성화 되는지 혹은 3개가 다 골라진 다음에야 활성화되는지 명시 필요. 모드를 선택할 때, 어떤 순번으로 선택되고 마지막 mode가 무엇인지 명시 필요. 설정 취소 요청은 어떻게 하는지 명시 필요.
2041	29	Use Case 26. Stop Beep에서 다수의 모드에 의해 Beep가 활성화 됐을 때, 아무 버튼을 누르면 어떻게 Beep가 멈추는지 명시 필요.

2. [A2] System Testing

1. Category-Partition Testing

Group	Category	Value	Constraint
State	Current Display	TimeKeeping	
		SetTime	
		Timer	
		SetTimer	
		Timer-stopped	
		Timer-running	
		Stopwatch-stopped	
		Stopwatch-running	
		Alarm	
		SetAlarm	
		WorldTime	
		TurnipCalculator	
		TurnipCalculator-input	
		SetMode	
	Current Beep	none	
beep			
Inputs	Input Ways	button A	
		button B	
		button C	
		button D	
		Wait 5 Sec	
		Wait 60 Sec	

All Test Cases = 14*2*6 = 168

#	Current Display	Current Beep	Input	Test Result
1	TimeKeep	none	button A	Pass
2	TimeKeep	none	button B	Pass
3	TimeKeep	none	button C	Pass
4	TimeKeep	none	button D	Pass
5	TimeKeep	none	Wait 5 sec	Pass
6	TimeKeep	none	Wait 60 sec	Pass
7	SetTime	none	button A	Pass
8	SetTime	none	button B	Pass
9	SetTime	none	button C	Pass
10	SetTime	none	button D	Pass
11	SetTime	none	Wait 5 sec	Pass
12	SetTime	none	Wait 60 sec	Pass
13	Timer	none	button A	Pass
14	Timer	none	button B	Pass
15	Timer	none	button C	Pass
16	Timer	none	button D	Pass
17	Timer	none	Wait 5 sec	Pass
18	Timer	none	Wait 60 sec	Pass
19	SetTimer	none	button A	Pass
20	SetTimer	none	button B	Pass
21	SetTimer	none	button C	Pass
22	SetTimer	none	button D	Pass
23	SetTimer	none	Wait 5 sec	Pass
24	SetTimer	none	Wait 60 sec	Pass
25	Timer-stopped	none	button A	Pass
26	Timer-stopped	none	button B	Pass
27	Timer-stopped	none	button C	Pass
28	Timer-stopped	none	button D	Pass
29	Timer-stopped	none	Wait 5 sec	Pass
30	Timer-stopped	none	Wait 60 sec	Pass
31	Timer-running	none	button A	Pass
32	Timer-running	none	button B	Pass
33	Timer-running	none	button C	Pass
34	Timer-running	none	button D	Pass
35	Timer-running	none	Wait 5 sec	Pass
36	Timer-running	none	Wait 60 sec	Pass

37	Stopwatch-stopped	none	button A	Pass
38	Stopwatch-stopped	none	button B	Pass
39	Stopwatch-stopped	none	button C	Pass
40	Stopwatch-stopped	none	button D	Pass
41	Stopwatch-stopped	none	Wait 5 sec	Pass
42	Stopwatch-stopped	none	Wait 60 sec	Pass
43	Stopwatch-running	none	button A	Pass
44	Stopwatch-running	none	button B	Pass
45	Stopwatch-running	none	button C	Pass
46	Stopwatch-running	none	button D	Pass
47	Stopwatch-running	none	Wait 5 sec	Pass
48	Stopwatch-running	none	Wait 60 sec	Pass
49	Alarm	none	button A	Pass
50	Alarm	none	button B	Pass
51	Alarm	none	button C	Pass
52	Alarm	none	button D	Pass
53	Alarm	none	Wait 5 sec	Pass
54	Alarm	none	Wait 60 sec	Pass
55	SetAlarm	none	button A	Pass
56	SetAlarm	none	button B	Pass
57	SetAlarm	none	button C	Pass
58	SetAlarm	none	button D	Pass
59	SetAlarm	none	Wait 5 sec	Pass
60	SetAlarm	none	Wait 60 sec	Pass
61	WorldTime	none	button A	Pass
62	WorldTime	none	button B	Pass
63	WorldTime	none	button C	Pass
64	WorldTime	none	button D	Pass
65	WorldTime	none	Wait 5 sec	Pass
66	WorldTime	none	Wait 60 sec	Pass
67	TurnipCalculator	none	button A	Pass
68	TurnipCalculator	none	button B	Pass
69	TurnipCalculator	none	button C	Pass
70	TurnipCalculator	none	button D	Pass
71	TurnipCalculator	none	Wait 5 sec	Pass
72	TurnipCalculator	none	Wait 60 sec	Pass
73	TurnipCalculator-input	none	button A	Pass

74	TurnipCalculator-input	none	button B	Pass
75	TurnipCalculator-input	none	button C	Pass
76	TurnipCalculator-input	none	button D	Pass
77	TurnipCalculator-input	none	Wait 5 sec	Pass
78	TurnipCalculator-input	none	Wait 60 sec	Pass
79	SetMode	none	button A	Pass
80	SetMode	none	button B	Pass
81	SetMode	none	button C	Pass
82	SetMode	none	button D	Pass
83	SetMode	none	Wait 5 sec	Pass
84	SetMode	none	Wait 60 sec	Pass
85	TimeKeep	beep	button A	Pass
86	TimeKeep	beep	button B	Pass
87	TimeKeep	beep	button C	Pass
88	TimeKeep	beep	button D	Pass
89	TimeKeep	beep	Wait 5 sec	Pass
90	TimeKeep	beep	Wait 60 sec	Pass
91	SetTime	beep	button A	Pass
92	SetTime	beep	button B	Pass
93	SetTime	beep	button C	Pass
94	SetTime	beep	button D	Pass
95	SetTime	beep	Wait 5 sec	Pass
96	SetTime	beep	Wait 60 sec	Pass
97	Timer	beep	button A	Pass
98	Timer	beep	button B	Pass
99	Timer	beep	button C	Pass
100	Timer	beep	button D	Pass
101	Timer	beep	Wait 5 sec	Pass
102	Timer	beep	Wait 60 sec	Pass
103	SetTimer	beep	button A	Pass
104	SetTimer	beep	button B	Pass
105	SetTimer	beep	button C	Pass
106	SetTimer	beep	button D	Pass
107	SetTimer	beep	Wait 5 sec	Pass
108	SetTimer	beep	Wait 60 sec	Pass
109	Timer-stopped	beep	button A	Pass
110	Timer-stopped	beep	button B	Pass

111	Timer-stopped	beep	button C	Pass
112	Timer-stopped	beep	button D	Pass
113	Timer-stopped	beep	Wait 5 sec	Pass
114	Timer-stopped	beep	Wait 60 sec	Pass
115	Timer-running	beep	button A	Pass
116	Timer-running	beep	button B	Pass
117	Timer-running	beep	button C	Pass
118	Timer-running	beep	button D	Pass
119	Timer-running	beep	Wait 5 sec	Pass
120	Timer-running	beep	Wait 60 sec	Pass
121	Stopwatch-stopped	beep	button A	Pass
122	Stopwatch-stopped	beep	button B	Pass
123	Stopwatch-stopped	beep	button C	Pass
124	Stopwatch-stopped	beep	button D	Pass
125	Stopwatch-stopped	beep	Wait 5 sec	Pass
126	Stopwatch-stopped	beep	Wait 60 sec	Pass
127	Stopwatch-running	beep	button A	Pass
128	Stopwatch-running	beep	button B	Pass
129	Stopwatch-running	beep	button C	Pass
130	Stopwatch-running	beep	button D	Pass
131	Stopwatch-running	beep	Wait 5 sec	Pass
132	Stopwatch-running	beep	Wait 60 sec	Pass
133	Alarm	beep	button A	Pass
134	Alarm	beep	button B	Pass
135	Alarm	beep	button C	Pass
136	Alarm	beep	button D	Pass
137	Alarm	beep	Wait 5 sec	Pass
138	Alarm	beep	Wait 60 sec	Pass
139	SetAlarm	beep	button A	Pass
140	SetAlarm	beep	button B	Pass
141	SetAlarm	beep	button C	Pass
142	SetAlarm	beep	button D	Pass
143	SetAlarm	beep	Wait 5 sec	Pass
144	SetAlarm	beep	Wait 60 sec	Pass
145	WorldTime	beep	button A	Pass
146	WorldTime	beep	button B	Pass
147	WorldTime	beep	button C	Pass

148	WorldTime	beep	button D	Pass
149	WorldTime	beep	Wait 5 sec	Pass
150	WorldTime	beep	Wait 60 sec	Pass
151	TurnipCalculator	beep	button A	Pass
152	TurnipCalculator	beep	button B	Pass
153	TurnipCalculator	beep	button C	Pass
154	TurnipCalculator	beep	button D	Pass
155	TurnipCalculator	beep	Wait 5 sec	Pass
156	TurnipCalculator	beep	Wait 60 sec	Pass
157	TurnipCalculator-input	beep	button A	Pass
158	TurnipCalculator-input	beep	button B	Pass
159	TurnipCalculator-input	beep	button C	Pass
160	TurnipCalculator-input	beep	button D	Pass
161	TurnipCalculator-input	beep	Wait 5 sec	Pass
162	TurnipCalculator-input	beep	Wait 60 sec	Pass
163	SetMode	beep	button A	Pass
164	SetMode	beep	button B	Pass
165	SetMode	beep	button C	Pass
166	SetMode	beep	button D	Pass
167	SetMode	beep	Wait 5 sec	Pass
168	SetMode	beep	Wait 60 sec	Pass

Test Failed = 0

Test Success = 168

2. Pair Wise Testing

※ Categorized Properties Based Input

Group	Category	Value
State	Current Display	TimeKeeping
		SetTime
		Timer
		SetTimer
		Timer-stopped
		Timer-running
		Stopwatch-stopped
		Stopwatch-running
		Alarm
		SetAlarm
		WorldTime
		TurnipCalculator
		TurnipCalculator-input
		SetMode
	Current Beep	none
beep		
Inputs	Input Ways	button A
		button B
		button C
		button D
		Wait 5 Sec
		Wait 60 Sec

#	Current Display	Current Beep	Input	Test Result
1	TimeKeeping	none	button A	Pass
2	SetTime	beep	button A	Pass
3	Timer	beep	button B	Pass
4	SetTimer	none	button B	Pass
5	Timer-stopped	none	button C	Pass
6	Timer-running	beep	button C	Pass
7	Stopwatch-stopped	beep	button D	Pass
8	Stopwatch-running	none	button D	Pass
9	Alarm	none	Wait 5 sec	Pass
10	SetAlarm	beep	Wait 5 sec	Pass
11	WorldTime	beep	Wait 60 sec	Pass
12	TurnipCalculator	none	Wait 60 sec	Pass
13	TurnipCalculator-input	none	Wait 60 sec	Pass
14	SetMode	none	Wait 60 sec	Pass
15	SetMode	beep	Wait 5 sec	Pass
16	TurnipCalculator-input	beep	Wait 5 sec	Pass
17	TurnipCalculator	beep	Wait 5 sec	Pass
18	WorldTime	none	Wait 5 sec	Pass
19	SetAlarm	none	Wait 60 sec	Pass
20	Alarm	beep	Wait 60 sec	Pass
21	Stopwatch-running	beep	Wait 60 sec	Pass
22	Stopwatch-stopped	none	Wait 60 sec	Pass
23	Timer-running	none	Wait 60 sec	Pass
24	Timer-stopped	beep	Wait 60 sec	Pass
25	SetTimer	beep	Wait 60 sec	Pass
26	Timer	none	Wait 60 sec	Pass
27	SetTime	none	Wait 60 sec	Pass
28	TimeKeeping	beep	Wait 60 sec	Pass
29	TimeKeeping	beep	Wait 5 sec	Pass
30	SetTime	beep	Wait 5 sec	Pass
31	Timer	beep	Wait 5 sec	Pass
32	SetTimer	beep	Wait 5 sec	Pass
33	Timer-stopped	beep	Wait 5 sec	Pass
34	Timer-running	beep	Wait 5 sec	Pass
35	Stopwatch-stopped	beep	Wait 5 sec	Pass
36	Stopwatch-running	beep	Wait 5 sec	Pass

37	Alarm	beep	button A	Pass
38	SetAlarm	beep	button A	Pass
39	WorldTime	beep	button A	Pass
40	TurnipCalculator	beep	button A	Pass
41	TurnipCalculator-input	beep	button A	Pass
42	SetMode	beep	button A	Pass
43	SetMode	beep	button B	Pass
44	TurnipCalculator-input	beep	button B	Pass
45	TurnipCalculator	beep	button B	Pass
46	WorldTime	beep	button B	Pass
47	SetAlarm	beep	button B	Pass
48	Alarm	beep	button B	Pass
49	Stopwatch-running	beep	button B	Pass
50	Stopwatch-stopped	beep	button B	Pass
51	Timer-running	beep	button B	Pass
52	Timer-stopped	beep	button B	Pass
53	SetTimer	beep	button A	Pass
54	Timer	beep	button A	Pass
55	SetTime	beep	button B	Pass
56	TimeKeeping	beep	button B	Pass
57	TimeKeeping	beep	button D	Pass
58	SetTime	beep	button D	Pass
59	Timer	beep	button D	Pass
60	SetTimer	beep	button D	Pass
61	Timer-stopped	beep	button A	Pass
62	Timer-running	beep	button A	Pass
63	Stopwatch-stopped	beep	button A	Pass
64	Stopwatch-running	beep	button A	Pass
65	Alarm	beep	button D	Pass
66	SetAlarm	beep	button D	Pass
67	WorldTime	beep	button D	Pass
68	TurnipCalculator	beep	button D	Pass
69	TurnipCalculator-input	beep	button D	Pass
70	SetMode	beep	button D	Pass
71	SetMode	beep	button C	Pass
72	TurnipCalculator-input	beep	button C	Pass
73	TurnipCalculator	beep	button C	Pass

74	WorldTime	beep	button C	Pass
75	SetAlarm	beep	button C	Pass
76	Alarm	beep	button C	Pass
77	Stopwatch-running	beep	button C	Pass
78	Stopwatch-stopped	beep	button C	Pass
79	Timer-running	beep	button D	Pass
80	Timer-stopped	beep	button D	Pass
81	SetTimer	beep	button C	Pass
82	Timer	beep	button C	Pass
83	SetTime	beep	button C	Pass
84	TimeKeeping	beep	button C	Pass

Test Failed = 0

Test Success = 84

3. Brute-Force Testing

PyAutoGui 사용하여 Brute-Force 테스트 실시.

무작위로 버튼을 200번 눌러보는 테스트 결과 이상 없음.

```
import pyautogui
import random

#startImg = pyautogui.locateOnScreen('start.PNG')
#buttonA = pyautogui.center(startImg)
#print(buttonA)

buttonA = 0
xOffset = 530
yOffset = 570
pushList = []
#state = ['TimeKeeping', 'Alarm', 'Timer', 'Stopwatch', 'WorldTime', 'TurnipCal',
'Mode Change']
state = 'TimeKeeping'
stateSwitchCount = [0, 0, 0, 0] #현재시간, 알람, 스톱워치, 타이머
componentCount = 0

def getButtonA():
    startImg = pyautogui.locateOnScreen('start.PNG')
    buttonA = pyautogui.center(startImg)
    pyautogui.moveTo(buttonA.x, buttonA.y, duration=0.1)
    return buttonA

def pushA(buttonA, xOffset, yOffset):
    pyautogui.moveTo(buttonA.x, buttonA.y, duration=0.1)
    pyautogui.click()

def pushB(buttonA, xOffset, yOffset):
    pyautogui.moveTo(buttonA.x, buttonA.y + yOffset, duration=0.1)
    pyautogui.click()
```

```

def pushC(buttonA, xOffset, yOffset):
    pyautogui.moveTo(buttonA.x + xOffset, buttonA.y, duration=0.1)
    pyautogui.click()

def pushD(buttonA, xOffset, yOffset):
    pyautogui.moveTo(buttonA.x + xOffset, buttonA.y + yOffset, duration=0.1)
    pyautogui.click()

def randomPush(buttonA, xOffset, yOffset, pushList, stateArg, stateSwitchCount,
count):
    index = 0
    state = stateArg
    while index < count:
        index = index + 1
        rn = random.randrange(0, 4)
        if rn == 0:
            pushA(buttonA, xOffset, yOffset)
            pushList.append('A')
            if state == 'TimeKeeping':
                pass
            elif state == 'SetTime':
                pass
            elif state == 'Timer':
                stateSwitchCount[3] = stateSwitchCount[3] + 1
            elif state == 'Timer-running':
                stateSwitchCount[3] = stateSwitchCount[3] + 1
            elif state == 'Timer-stopped':
                stateSwitchCount[3] = stateSwitchCount[3] + 1
            elif state == 'SetTimer':
                pass
            elif state == 'Stopwatch':
                stateSwitchCount[2] = stateSwitchCount[2] + 1
            elif state == 'Stopwatch-stopped':

```

```

        stateSwitchCount[2] = stateSwitchCount[2] + 1
elif state == 'Stopwatch-running':
    stateSwitchCount[2] = stateSwitchCount[2] + 1
elif state == 'Alarm':
    pass
elif state == 'SetAlarm':
    pass
elif state == 'WorldTime':
    pass
elif state == 'TurnipCalculator':
    pass
elif state == 'TurnipCalculator-input':
    pass
elif state == 'SetMode':
    pass
else:
    pass

elif rn == 1:
    pushB(buttonA, xOffset, yOffset)
    pushList.append('B')
    if state == 'TimeKeeping':
        state = 'Alarm'
    elif state == 'SetTime':
        state = 'TimeKeeping'
    elif state == 'Timer':
        state = 'TimeKeeping'
    elif state == 'Timer-running':
        state = 'TimeKeeping'
    elif state == 'Timer-stopped':
        state = 'TimeKeeping'
    elif state == 'SetTimer':
        state = 'Timer'
    elif state == 'Stopwatch':

```



```
        state = 'Timer'
elif state == 'Stopwatch-stopped':
    state = 'Timer'
elif state == 'Stopwatch-running':
    state = 'Timer'
elif state == 'Alarm':
    state = 'Stopwatch'
elif state == 'SetAlarm':
    state = 'Alarm'
elif state == 'WorldTime':
    pass
elif state == 'TurnipCalculator':
    pass
elif state == 'TurnipCalculator-input':
    state = 'TurnipCalculator'
elif state == 'SetMode':
    pass
else:
    pass

elif rn == 2:
    pushC(buttonA, xOffset, yOffset)
    pushList.append('C')
    if state == 'TimeKeeping':
        state = 'SetTime'
    elif state == 'SetTime':
        pass
    elif state == 'Timer':
        state = 'SetTimer'
    elif state == 'Timer-running':
        pass
    elif state == 'Timer-stopped':
        state = 'SetTimer'
    elif state == 'SetTimer':
```

```
        pass
    elif state == 'Stopwatch':
        pass
    elif state == 'Stopwatch-stopped':
        pass
    elif state == 'Stopwatch-running':
        pass
    elif state == 'Alarm':
        state = 'SetAlarm'
    elif state == 'SetAlarm':
        pass
    elif state == 'WorldTime':
        pass
    elif state == 'TurnipCalculator':
        state = 'TurnipCalculator-input'
    elif state == 'TurnipCalculator-input':
        pass
    elif state == 'SetMode':
        pass
    else:
        pass
```

else:

```
    pushD(buttonA, xOffset, yOffset)
    pushList.append('D')
    if state == 'TimeKeeping':
        state = 'SetMode'
    elif state == 'SetTime':
        pass
    elif state == 'Timer':
        pass
    elif state == 'Timer-running':
        pass
    elif state == 'Timer-stopped':
```

```
        pass
    elif state == 'SetTimer':
        pass
    elif state == 'Stopwatch':
        pass
    elif state == 'Stopwatch-stopped':
        pass
    elif state == 'Stopwatch-running':
        state = 'Stopwatch-stop'
    elif state == 'Alarm':
        pass
    elif state == 'SetAlarm':
        pass
    elif state == 'WorldTime':
        pass
    elif state == 'TurnipCalculator':
        pass
    elif state == 'TurnipCalculator-input':
        pass
    elif state == 'SetMode':
        state = 'TimeKeeping'
    else:
        pass
print(state)
```

```
buttonA = getButtonA()
```

```
randomPush(buttonA, xOffset, yOffset, pushList, state, stateSwitchCount, 200)
```

```
print(pushList)
```

결과

['B', 'D', 'D', 'D', 'A', 'C', 'B', 'D', 'D', 'B', 'C', 'A', 'A', 'A', 'A', 'B', 'C', 'D', 'C', 'A',
'C', 'A', 'C', 'C', 'D', 'A', 'B', 'D', 'B', 'C', 'A', 'B', 'D', 'A', 'D', 'C', 'B', 'D', 'D', 'D',
'B', 'B', 'C', 'B', 'B', 'A', 'D', 'C', 'B', 'B', 'C', 'D', 'D', 'A', 'A', 'C', 'B', 'C', 'B', 'D',
'B', 'B', 'B', 'A', 'B', 'B', 'D', 'D', 'D', 'C', 'A', 'A', 'D', 'B', 'A', 'C', 'B', 'A', 'D', 'B',
'D', 'C', 'B', 'D', 'D', 'B', 'A', 'C', 'C', 'B', 'A', 'C', 'D', 'C', 'B', 'A', 'D', 'B', 'B', 'B',
'B', 'B', 'C', 'D', 'A', 'D', 'C', 'D', 'C', 'D', 'B', 'D', 'D', 'D', 'A', 'B', 'A', 'C', 'A', 'B',
'C', 'A', 'A', 'D', 'B', 'C', 'B', 'D', 'B', 'B', 'D', 'D', 'A', 'B', 'B', 'A', 'C', 'B', 'B', 'C',
'C', 'A', 'D', 'D', 'B', 'C', 'C', 'D', 'D', 'B',
'B', 'B', 'A', 'B', 'A', 'D', 'B', 'B', 'C', 'D', 'B', 'B', 'A', 'A', 'D', 'A', 'C', 'B', 'C', 'C', 'C',
'B', 'D', 'A', 'B', 'B', 'A', 'B', 'D', 'C', 'B', 'B', 'A', 'C', 'A', 'B', 'C', 'C', 'D', 'A', 'D',
'C', 'A', 'D', 'A', 'A', 'C', 'A', 'D', 'C']

시스템 양호.