

# Software Unit Testing Report

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# Introduction

- Objective
  - 본 문서는 소프트웨어 공학 개론 B반 T4 팀이 개발한 Digital watch system을 위한 문서이다.
  
- Reference
  - SRS Ver. DS-2012.DWS.SRS-2.1 (2012-08-17)
  - B. T4 SRA Ver. 5.0
  - B. T4 SDS Ver. 2.0
  
- Testing Version 2.0
  - 수업 진행 후 comment 를 받고, Testing 의 관점을 수정해서 다시 진행

# Test plan

Identifier	Feature	State	Input	Expected Output
UT.000.000	1.1 A button Interface	None	A button input, Tick	A button pressed
UT.000.001	1.2 B button Interface	None	B button input, Tick	A button pressed
UT.000.002	1.3 C button Interface	None	C button input, Tick	A button pressed
UT.000.003	1.4 D button Interface	None	D button input, Tick	A button pressed
UT.000.004	1.5 Sending Data		A, B, C, D button pressed	Button Storage

- Interface 는 test 에서 제외
- 1.5 Sending Data = input() ? – 역시 test 제외

# Test plan

Identifier	Feature	State	Input	Expected Output
	2.1.1 Mode Controller	Mode에 대한 내용이 명시되어 있지 않음	Button Storage, State Storage	State
UT.001.000		a.state_Data = 0	a	a.state_Data == 1
UT.001.001		a.state_Data = 0	c	a.state_Data == 2
UT.001.002		a.state_Data = 1	a	a.state_Data == 0
UT.001.003		a.state_Data = 2	c	a.state_Data == 0
	2.1.2 Back light Mode		Trigger, Tick	Back light display
UT.002.000		Backlight Mode OFF	d	Backlight Mode ON
UT.002.001		Backlight Mode ON	CurrentTime – PointTime > 2	Backlight Mode OFF

- 2.1.2 Back light Mode 없음 – test 불가
- Point time 없음 – test 불가

# Test plan

Identifier	Feature	State	Input	Expected Output
	2.1.3 Showing time Control	3가지 기능이 한곳에 모여 있음	Tick	Trigger
UT.003.000	Increase	a.Main_Time.milsec = 0	Tick	a.Main_Time.milsec == 1
UT.003.001	Initialize	a.Main_Time.milsec = 99 a.Main_Time.sec = 0	Tick	a.Main_Time.milsec == 0 a.Main_Time.sec == 1
UT.003.002		a.Main_Time.sec = 60 a.Main_Time.min = 0	Tick	a.Main_Time.sec == 0 a.Main_Time.min == 1
UT.003.003		a.Main_Time.min = 60 a.Main_Time.hour = 0	Tick	a.Main_Time.min == 0 a.Main_Time.hour == 1
UT.003.004		a.Main_Time.hour = 12 a.Main_Time.PMIndicator = 1 a.Main_Time.Day = 1	Tick	a.Main_Time.hour == 0 a.Main_Time.PMIndicator == 0 a.Main_Time.Day == 2
UT.003.005		a.Main_Time.Day = 32 a.Main_Time.Month = 1	Tick	a.Main_Time.Day == 1 a.Main_Time.Month == 2
UT.003.006		a.Main_Time.Month = 13 a.Main_Time.Year = 2012	Tick	a.Main_Time.M == 1 a.Main_Time.min == 2013

- 2.1.3 의 Showing time Control 은 3 가지 기능으로 분할 되는 것으로 DFD에 나와 있는데, 구현은 하나의 function으로 되어 있음.
- 2.1.7, 2.1.8, 2.1.9 process 들을 같이 test 함

# Test plan

Identifier	Feature	State	Input	Expected Output
UT.003.007	PM Indicator	a.Main_Time.hour >= 12 && a.Main_Time.hour < 24	Tick	a.Main_Time.PMIndicator == 1
UT.003.008		a.Main_Time.hour < 12 && a.Main_Time.hour >= 0	Tick	a.Main_Time.PMIndicator == 0
	2.1.4 Time Keeping Control	4가지 기능이 한 곳에 모여 있음	Enable, Disable	Trigger
UT.004.000	Increase time	a.State_Data = 1 a.Main_Time.sec = 0 a.Main_Time.Selected = 0	b	a.Main_Time.sec = 1
UT.004.001		a.State_Data = 1 a.Main_Time.hour = 0 a.Main_Time.Selected = 1	b	a.Main_Time.hour = 1
UT.004.002		a.State_Data = 1 a.Main_Time.min = 0 a.Main_Time.Selected = 2	b	a.Main_Time.min = 1
UT.004.003		a.State_Data = 1 a.Main_Time.Year = 2012 a.Main_Time.Selected = 3	b	a.Main_Time.Year = 2013

# Test plan

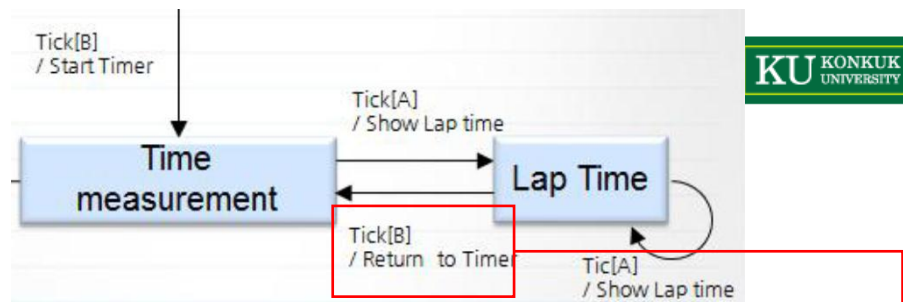
Identifier	Feature	State	Input	Expected Output
UT.004.004		a.State_Data = 1 a.Main_Time.Month = 1 a.Main_Time.Selected = 4	b	a.Main_Time.Month == 2
UT.004.005		a.State_Data = 1 a.Main_Time.Day = 1 a.Main_Time.Selected = 5	b	a.Main_Time.sec == 2
UT.004.006	PM Indicator	a.State_Data = 1 a.Main_Time.hour >= 12 && a.Main_Time.hour < 24	Tick	a.Main_Time.PMIndicator == 1
UT.004.007		a.State_Data = 1 Value1 = Max && a.Main_Time.hour >= 12 && a.Main_Time.hour >= 24	Tick	a.Main_Time.PMIndicator == 0
UT.004.008	Initialize time	a.State_Data = 1 a.Main_Time.Selected = 0 a.Main_Time.sec = 60	b	a.Main_Time.sec == 0
UT.004.009		a.State_Data = 1 a.Main_Time.Selected = 1 a.Main_Time.hour = 12 a.Main_Time.PMIndicator = 1	b	a.Main_Time.hour == 0



# Test plan

Identifier	Feature	State	Input	Expected Output
UT.004.010		a.State_Data = 1 a.Main_Time.Selected = 2 a.Main_Time.min = 60	b	a.Main_Time.min == 0
UT.004.011		a.State_Data = 1 a.Main_Time.Selected = 3 a.Main_Time.Year = 2100	b	a.Main_Time.Year = 2012
UT.004.012		a.State_Data = 1 a.Main_Time.Selected = 4 a.Main_Time.Month = 13	b	a.Main_Time.Month = 1
UT.004.013		a.State_Data = 1 a.Main_Time.Selected = 5 a.Main_Time.Day = 31 a.Main_Time.Month = 1	b	a.Main_Time.Day = 1
UT.004.014	Point changer	a.State_Data = 1 a.Main_Time.Selected = 0	c	a.Main_Time.Selected == 1
UT.004.015		a.State_Data = 1 a.Main_Time.Selected = 1	c	a.Main_Time.Selected == 2
UT.004.016		a.State_Data = 1 a.Main_Time.Selected = 2	c	a.Main_Time.Selected == 3
UT.004.007		a.State_Data = 1 a.Main_Time.Selected = 3	c	a.Main_Time.Selected == 4
UT.004.018		a.State_Data = 1 a.Main_Time.Selected = 4	c	a.Main_Time.Selected == 5
UT.004.019		a.State_Data = 1 a.Main_Time.Selected = 5	c	a.Main_Time.Selected == 0

# Test plan



Identifier	Feature	State	Input	Expected Output
	2.1.5 Stopwatch control		Enable, Disable, Tick	Trigger
UT.005.000		a.state_Data = 2 a.Main_STW.s_flage = 0	b	a.Main_STW.s_flage == 1
UT.005.001		a.state_Data = 2 a.Main_STW.s_flage = 1	b	a.Main_STW.s_flage == 0
UT.005.002		a.state_Data = 2 a.Main_STW.s_flage = 0	a	a.Main_STW.C_Time.milsec == 0 a.Main_STW.C_Time.sec == 0 a.Main_STW.C_Time.min == 0 a.Main_STW.s_flage == 0
UT.005.003		a.state_Data = 2 a.Main_STW.s_flage = 1	a	a.Main_STW.d_flage == 1
UT.005.004		a.state_Data = 2 a.Main_STW.d_flage = 1	a	a.Main_STW.s_flage == 0
UT.005.005		a.state_Data = 2 a.Main_STW.d_flage = 1	b	a.Main_STW.s_flage == 1 a.Main_STW.d_flage == 0

- 문서만 보서는 위와 같은 관계를 알 수 없습니다.
  - Test case 를 작성을 못하고 코드를 보고 유추 했습니다.
    - 그렇다면 사실 이 상태는 test 불가 입니다.
  - 조금 더 디테일 하게 작성을 해야 할 것 같습니다.

# Test plan

Identifier	Feature	State	Input	Expected Output
	2.1.6 Back light display	없음		
	2.1.7 Increase time	없음		
	2.1.8 PM Indicator	없음		
	2.1.9 Initialize	없음		
	2.1.10 Increase time	없음		
	2.1.11 PM indicator	없음		
	2.1.12 Initialize	없음		
	2.1.13 Point changer	없음		
	2.1.14 Time start	없음		
	2.1.15 Time stop	없음		
	2.1.16 Show laptime	없음		
	2.1.17 Timer initialize	없음		
	2.1.18 Display controller		State Storage, Stopwatch Storage, Current time Storage	Display

- Display 는 test 에서 제외

# Test result

Automated Test Run Results		
Running Suite Mode Controller		
	Running test DWS.UTC_001_000 ...	Passed
	Running test DWS.UTC_001_001 ...	Passed
	Running test DWS.UTC_001_002 ...	Passed
	Running test DWS.UTC_001_003 ...	Passed
Running Suite Back light Mode		
	Running test DWS.UTC_002_000 ...	Failed
<b>File Name</b>	C:\Users\Sub\W.hudson\jobs\test_T4\workspace\src\Test1.c	<b>Line Number</b> 69
<b>Condition</b>	0	
	Running test DWS.UTC_002_001 ...	Failed
<b>File Name</b>	C:\Users\Sub\W.hudson\jobs\test_T4\workspace\src\Test1.c	<b>Line Number</b> 74
<b>Condition</b>	0	
Running Suite Showing time Control		
	Running test DWS.UTC_003_000 ...	Passed
	Running test DWS.UTC_003_001 ...	Passed
	Running test DWS.UTC_003_002 ...	Passed
	Running test DWS.UTC_003_003 ...	Passed
	Running test DWS.UTC_003_004 ...	Failed
<b>File Name</b>	C:\Users\Sub\W.hudson\jobs\test_T4\workspace\src\Test1.c	<b>Line Number</b> 146
<b>Condition</b>	a.Main_Time.PMIndicator == 0 && a.Main_Time.Hour == 0 && a.Main_Time.Day == 2	
	Running test DWS.UTC_003_005 ...	Passed
	Running test DWS.UTC_003_006 ...	Passed
	Running test DWS.UTC_003_007 ...	Passed
	Running test DWS.UTC_003_008 ...	Failed
<b>File Name</b>	C:\Users\Sub\W.hudson\jobs\test_T4\workspace\src\Test1.c	<b>Line Number</b> 198
<b>Condition</b>	a.Main_Time.PMIndicator == 0	

# Test result

Running Suite Time Keeping Control		
	Running test DWS_UTC_004_000 ...	Passed
	Running test DWS_UTC_004_001 ...	Passed
	Running test DWS_UTC_004_002 ...	Passed
	Running test DWS_UTC_004_003 ...	Passed
	Running test DWS_UTC_004_004 ...	Passed
	Running test DWS_UTC_004_005 ...	Passed
	Running test DWS_UTC_004_006 ...	Passed
	Running test DWS_UTC_004_007 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 317
<b>Condition</b>	a.Main_Time.PMIndicator == 0	
	Running test DWS_UTC_004_008 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 332
<b>Condition</b>	a.Main_Time.sec == 0	
	Running test DWS_UTC_004_009 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 348
<b>Condition</b>	a.Main_Time.Hour == 0	
	Running test DWS_UTC_004_010 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 363
<b>Condition</b>	a.Main_Time.min == 0	
	Running test DWS_UTC_004_011 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 378
<b>Condition</b>	a.Main_Time.Year == 2012	
	Running test DWS_UTC_004_012 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 393
<b>Condition</b>	a.Main_Time.Month == 2	
	Running test DWS_UTC_004_013 ...	Failed
<b>File Name</b>	C:\Users\Sub\workspace\src\Test1.c	<b>Line Number</b> 409
<b>Condition</b>	a.Main_Time.Day == 2	

# Test result

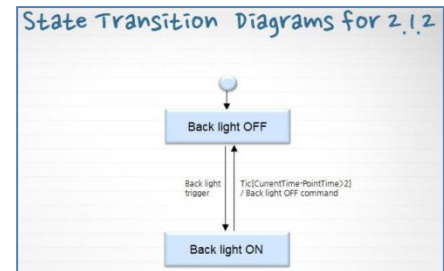
	Running test DWS_UTC_004_014 ...	Passed			
	Running test DWS_UTC_004_015 ...	Passed			
	Running test DWS_UTC_004_016 ...	Passed			
	Running test DWS_UTC_004_017 ...	Passed			
	Running test DWS_UTC_004_018 ...	Passed			
	Running test DWS_UTC_004_019 ...	Passed			
Running Suite Stop watch Control					
	Running test DWS_UTC_005_000 ...	Passed			
	Running test DWS_UTC_005_001 ...	Passed			
	Running test DWS_UTC_005_002 ...	Passed			
	Running test DWS_UTC_005_003 ...	Passed			
	Running test DWS_UTC_005_004 ...	Passed			
	Running test DWS_UTC_005_005 ...	Failed			
<b>File Name</b>	C:\Users\SubW.hudson\jobs\test_T4\workspace\src\Test1.c	<b>Line Number</b> 582			
<b>Condition</b>	a.Main_STW.d_flag == 0 && a.Main_STW.s_flag == 1				
<b>Cumulative Summary for Run</b>					
<b>Type</b>	<b>Total</b>	<b>Run</b>	<b>Succeeded</b>	<b>Failed</b>	<b>Inactive</b>
Suites	5	5	- NA -	0	0
Test Cases	41	41	29	12	0
Assertions	41	41	29	12	n/a

# Test result

- UT\_002\_000, UT\_002\_001 은 PM Indicator 관련된 부분입니다. DFD와 구현의 차이 때문에 test case 를 만들지 못했습니다
- UT\_003\_004, UT\_003\_004, UT\_003\_007, UT\_003\_008 도 역시 PM Indicator 관련 부분인데 003,007는 우연히 default 값이 일치하여 Passed 가 나왔고 004,008 는 Fail 입니다.
- UT 004\_007 ~ 013 Fail 은 TIMEKEEPING mode 일 때, initialize 기능을 확인하려고 만들었는데, 함수가 Increase time 기능도 포함하고 있어서 Fail이 나왔습니다.
- 나머지는 code를 보고 이해할 수 있는 만큼 case를 구성하여 수행하였고 모두 passed 가 된 것을 확인 하였습니다.

# Test result

- 문서만 보고 test case 를 작성 할 수 없었습니다.
  - Data type 이나 자료를 저장하는 struct 에 대한 구체적인 명시가 문서에 정의 되어 있지 않았고, 기능도 분할되어 있지 않았습니다.
  - Data dictionary 나 State diagram 같은 경우는 너무 상위 단에서 개념적으로 정의 되어 있어 구체적인 상태를 알기 어려웠습니다.
  - DFD 를 보면 2.1.4, 2.1.5, 2.1.6, 2.1.19 같은 경우 각각 3가지로 기능이 분할 된다고 나와 있는데 모두 하나의 함수로 구현 되어 있었습니다.
- 문서를 조금 더 자세히 작성 할 필요가 있을 것 같습니다.
- 늦어서 죄송합니다..
  - ..T^T



Back light OFF command 는 어떤 기능인지 모르겠습니다. 모든 State diagram 들이 직관적으로는 이해할 수 있겠지만, 이해하거나 구현하기에는 설명이 조금 부족한 듯이 보입니다. 구현상에서 CurrentTime-PointTime 이라는 것은 실행하지 않는 것으로 보입니다.