

2013-2 Software Engineering
Team Presentation #1

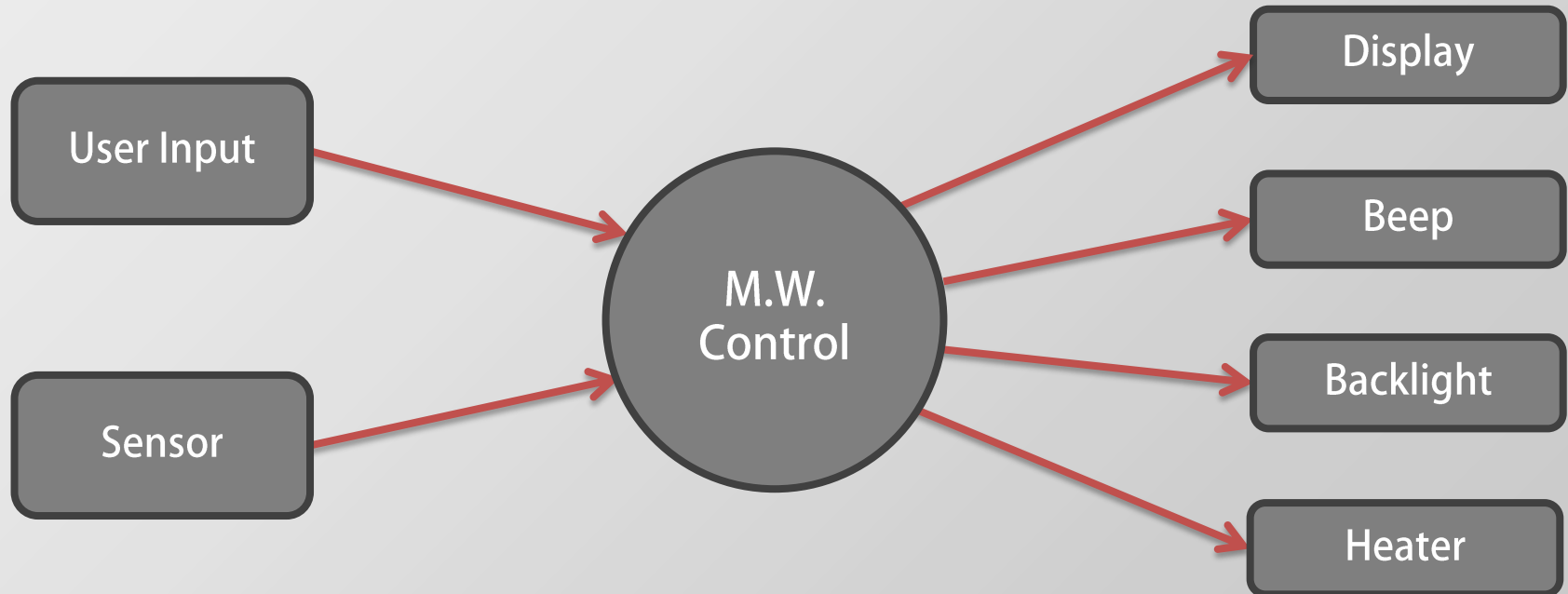
Software Requirement Specification for Microwave Oven System

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CONTENTS

- 1 System Context Diagram
- 2 Event Lists
- 3 Data Flow Diagram & Data Dictionary
[Lv.0 ~ Lv.4]
- 4 Conclusion + QnA

System Context Diagram – MW



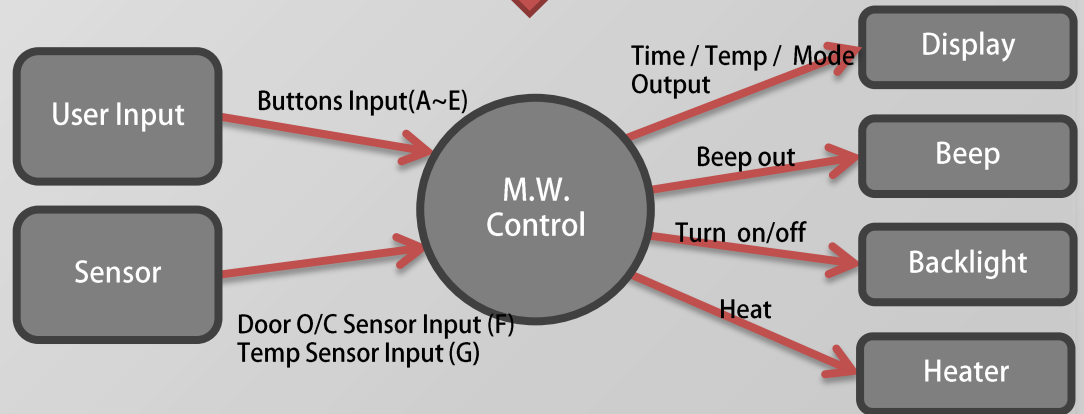
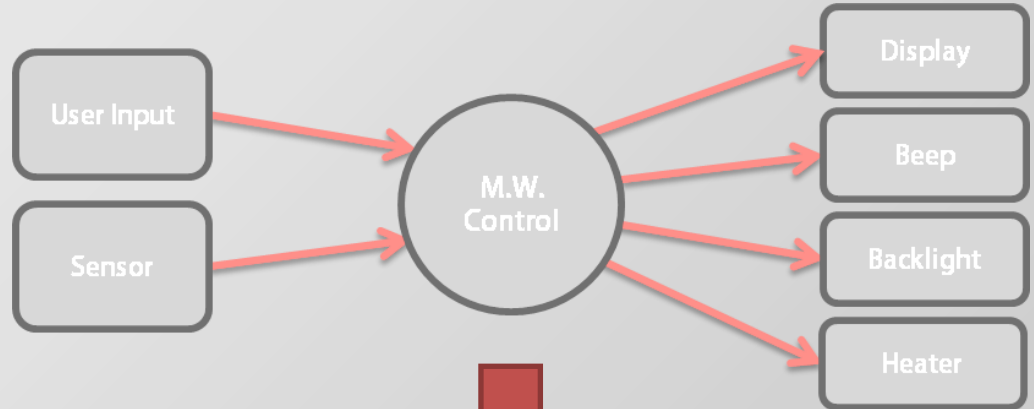
Event List – MW

Input / Output Event		Description	Type
Button Input	Button A	[Depending on Time/Temp Mode] Add 10sec / 10°C	Interrupt
	Button B	[Depending on Time/Temp Mode] Add 30sec / 20°C	Interrupt
	Button C	Switch the setting mode (Time ↔ Temp)	Interrupt
	Button D	Select Mode (Manual → 떡 → 죽 → 국/찌개 → 피자 → Manual)	Interrupt
	Button E	Start / Cancel	Interrupt
Door O/C Sensor Input (F)		Detects door conditions (Open / Close) of Microwave	Periodic
Temp Sensor Input (G)		Detects current temperature [Supposing that temperature goes up automatically (10°C /3sec)]	Periodic
Time/Temp/Mode Output		Display 1 and Display 2 show Time/Temp/Mode information <ul style="list-style-type: none"> · Display 1 : (cooking) Remaining Time / Current Temp (setting) Entered Time / Entered Temp · Display 2 : Selected Mode 	Periodic
Beep Out		Beep out (3sec)	Periodic
Turn On/Off		Turn backlight on	Interrupt
Heat		Activate heater	Interrupt

Input / Output Event List (Abstract ver.)

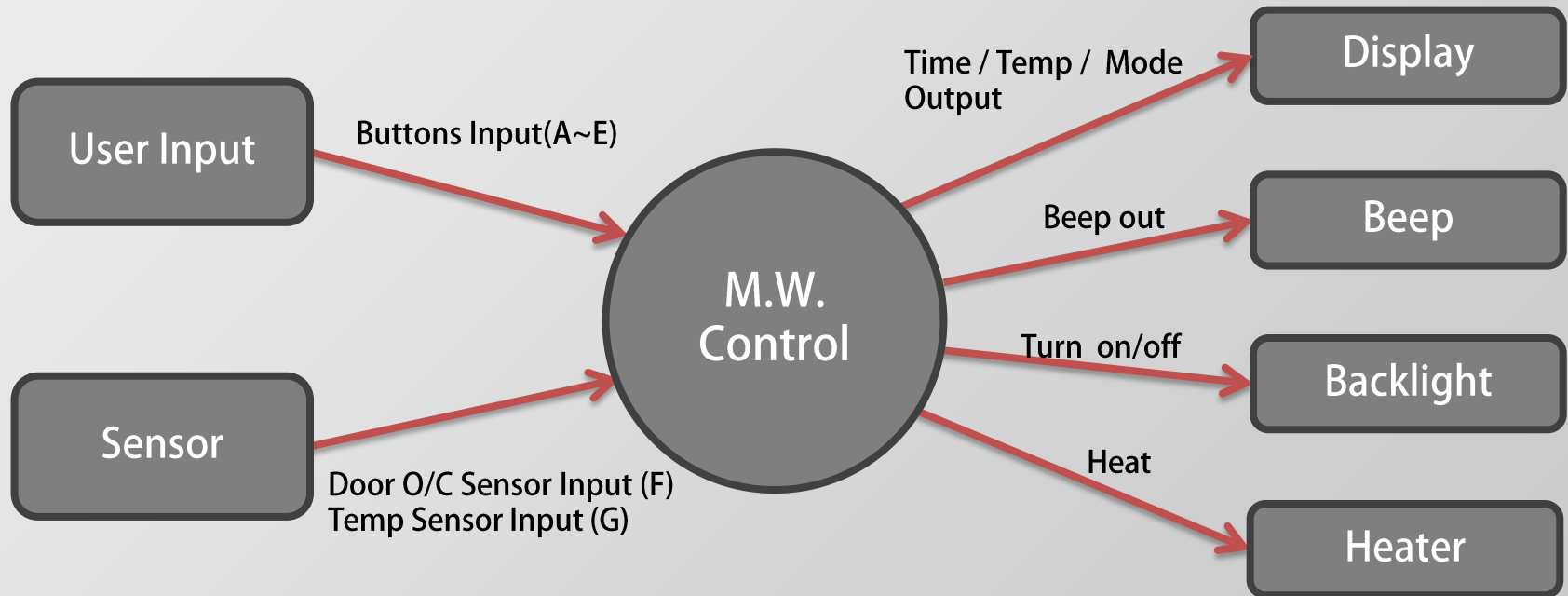
Button Input	Button A
	Button B
	Button C
	Button D
	Button E
Door O/C Sensor Input (F)	
Temp Sensor Input (G)	

Time/Temp/Mode Output	
Beep Out	
Turn On	
Heat	

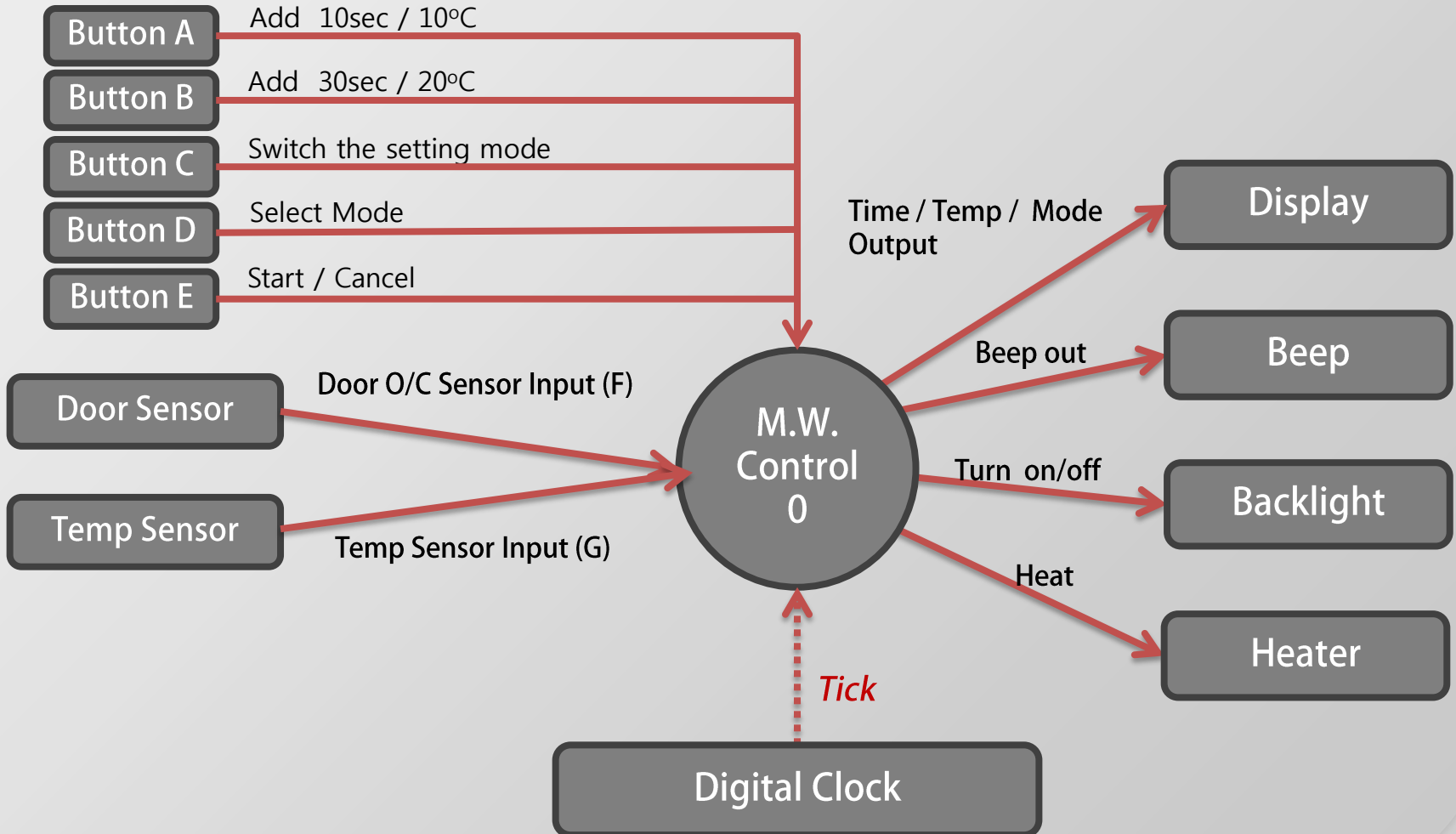


Context Diagram for M.W.

System Context Diagram (+Event) – MW



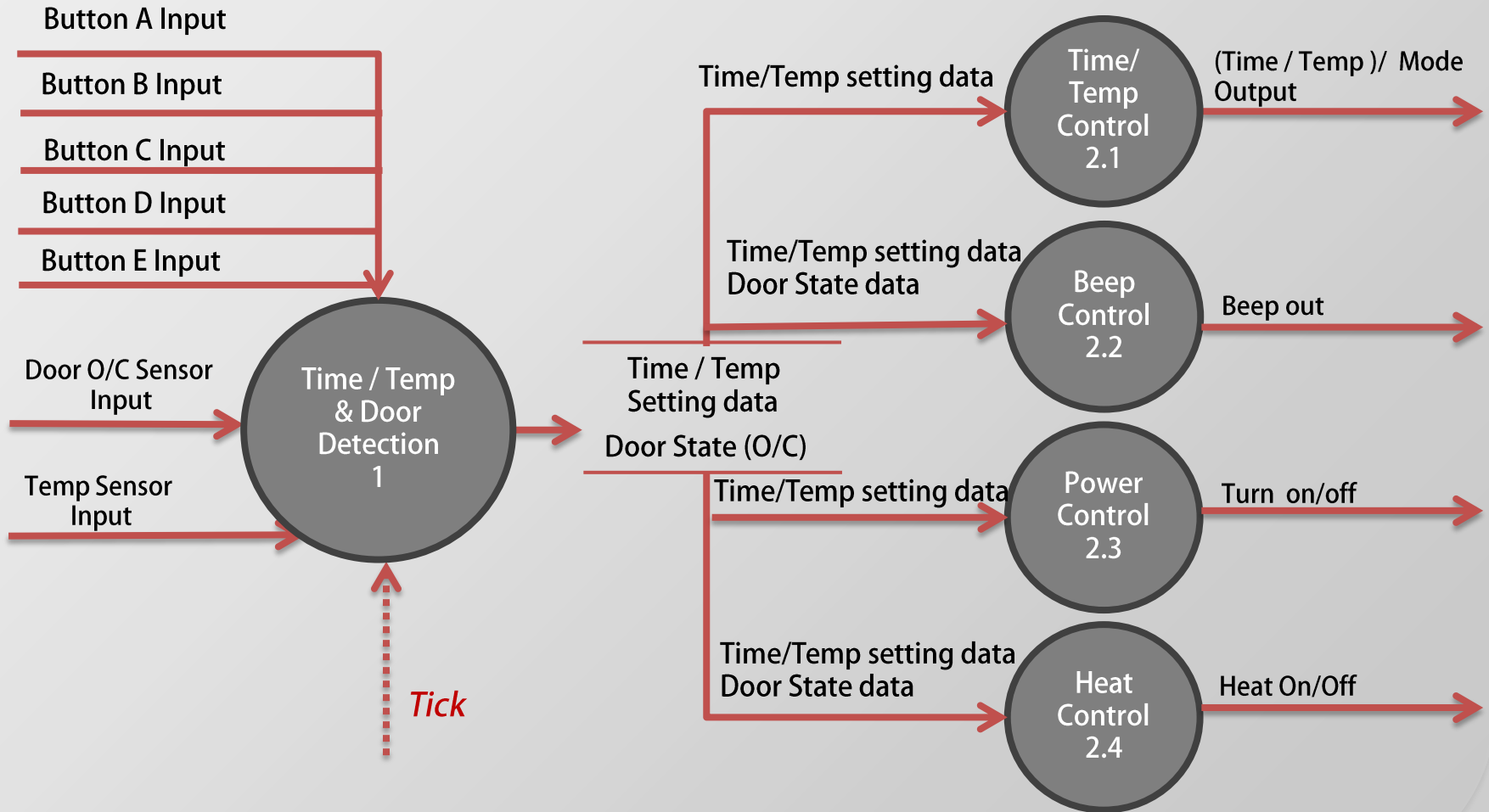
DFD **Level 0** – MW



DFD Level 0 – MW [Data Dictionary]

Input / Output Event		Description	Format / Type
Time Tick		[tick = 1 sec] 1 tick 당 1초로 계산	U_int
Button Input	Button A	Add 10sec / 10°C	Keyboard Input / U_int
	Button B	Add 30sec / 20°C	Keyboard Input / U_int
	Button C	Switch the setting mode (Time ↔ Temp)	Keyboard Input / Boolean [time==1, temp==0]
	Button D	Select Mode	Keyboard Input / U_int
	Button E	Start / Cancel	Keyboard Input / Boolean [start==1, cancel==0]
Door O/C Sensor Input (F)		Detects door conditions (Open / Close)	Keyboard Input / Boolean [open==1, close==0]
Temp Sensor Input (G)		Detects current temperature	U_int
Time/Temp/Mode Output		Display 1 and Display 2 show Time/Temp/Mode info. <ul style="list-style-type: none"> • Display 1 : (cooking) Remaining Time / Current Temp (setting) Entered Time / Entered Temp • Display 2 : Selected Mode 	Periodic / char
Beep Output		Beep out (3sec)	Boolean [beep==1, silent==0]
Turn On/Off Output		Turn backlight on	Boolean [on==1, off==0]
Heat On/Off		Activate heater	Boolean [on==1, off==0]

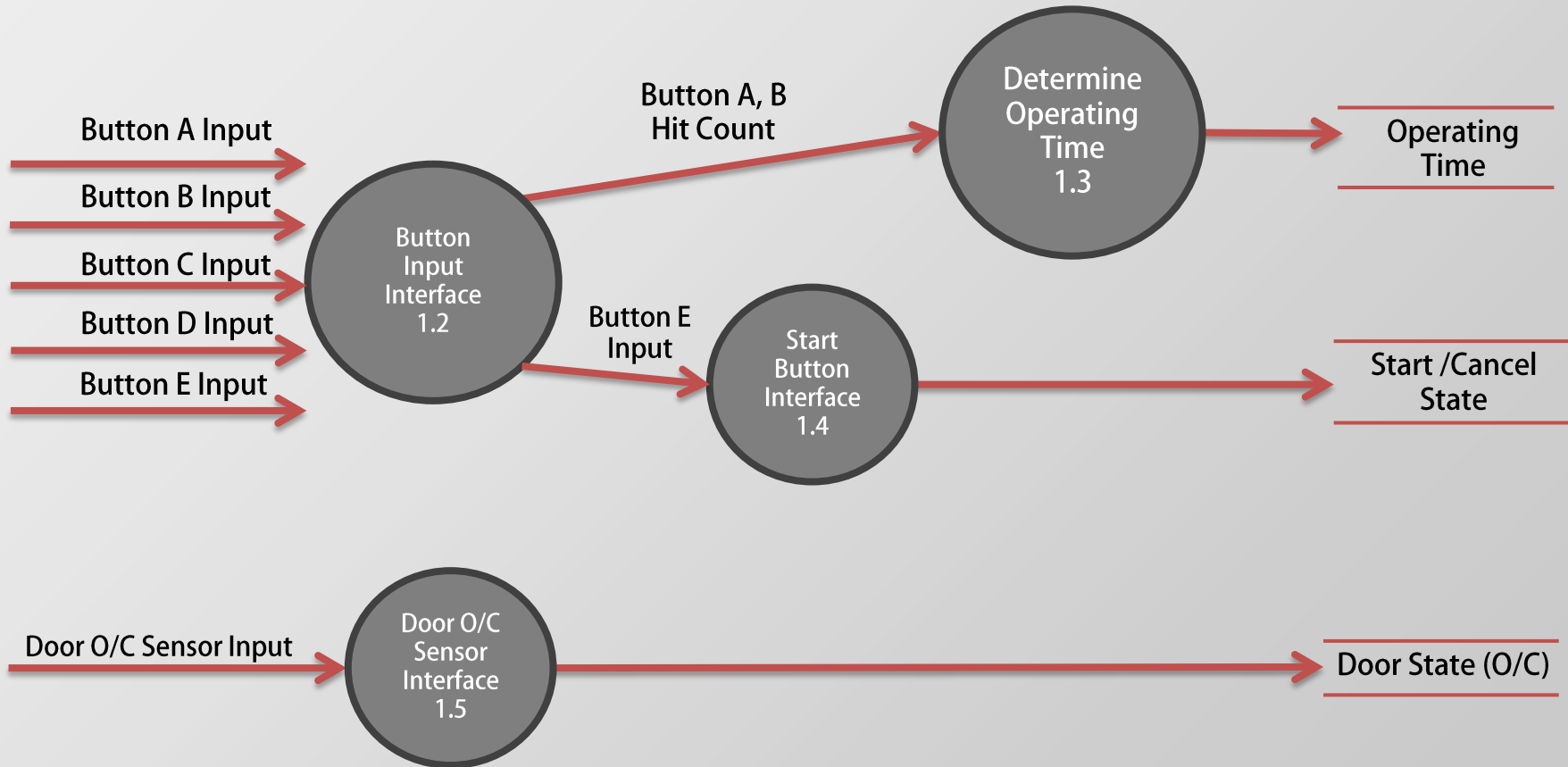
DFD Level 1 – MW



DFD Level 1 – MW [Data Dictionary]

Input / Output Event	Description	Format / Type
Door O/C Sensor Input (F)	Detects door conditions (Open / Close)	Keyboard Input / Boolean
Temp Sensor Input (G)	Detects current temperature	U_int
Time/Temp Setting Data Output	How many times selecting (Button A or B)	U_int
	Time/Temp mode selected (Button C)	Boolean [time==1, temp==0]
Door state Output	Door Open/Close State (Button F)	Boolean [open==1, close==0]
Turn On/Off Output	Power On/Off State	Boolean [on==1, off==0]
Heat On/Off	Heat On/Off State	Boolean [on==1, off==0]

DFD Level 2 – MW (before Control view)



Demo in DFD Level 2 – MW (Evidence of output data flow)

```
shell@shell-PC ~/Microwave
$ gcc main.c microwave.c -o main

shell@shell-PC ~/Microwave
$ ./main

=====
(설정 중) 00 : 00
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 00 : 10
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
```

↑
About Time
When press Button A,
We can see time goes up 10

About Door State →

```
=====
(설정 중) 10 : 00
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 00 : 30
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 20도 : 20도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 20도 : 70도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 20도 : 80도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 20도 : 90도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

(설정 중) 20도 : 40도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====

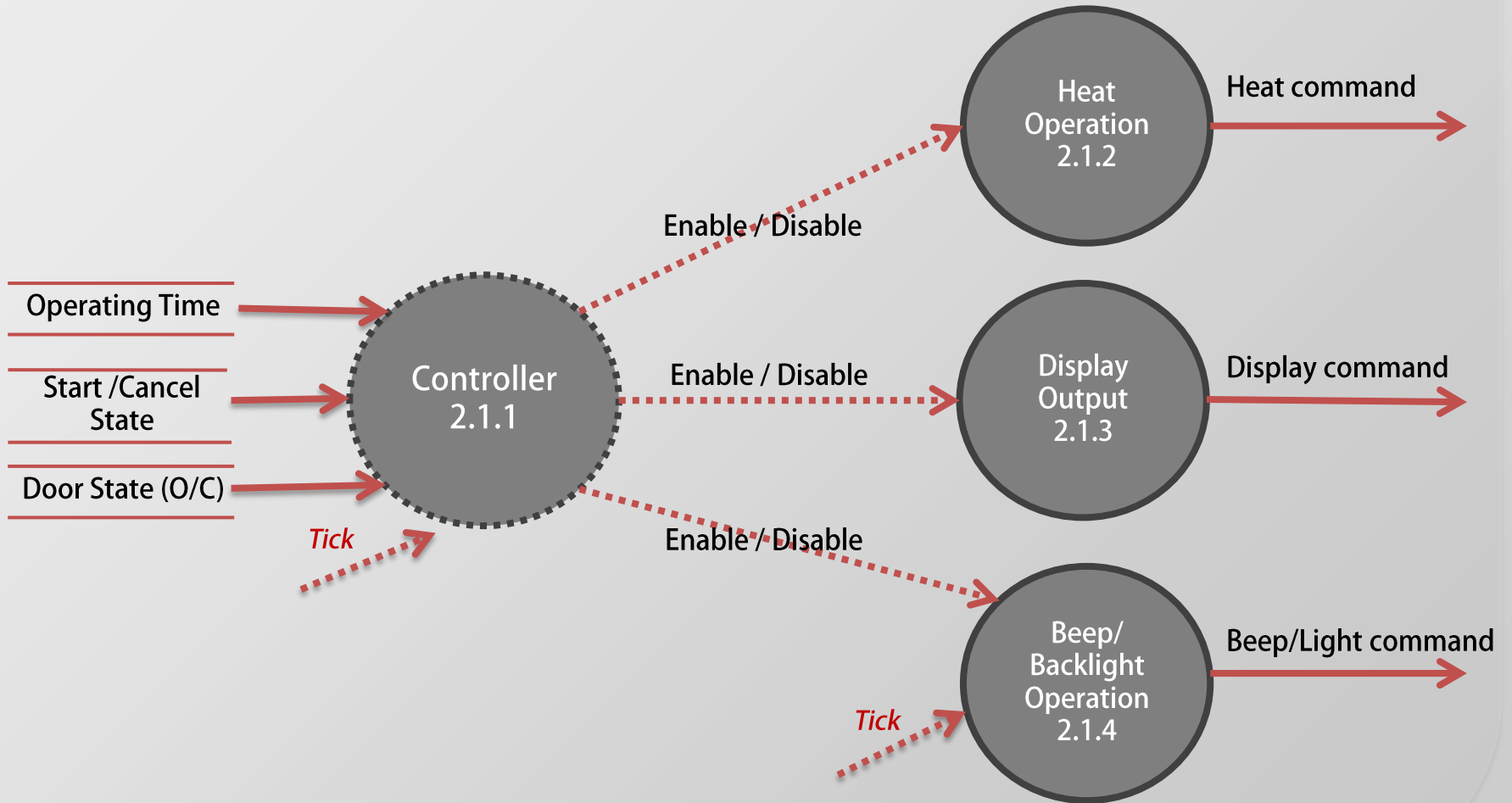
(설정 중) 20도 : 40도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 열려있음
=====
```

↑
About Temp
When press Button A,
We can see temp goes up 10

DFD Level 2 – MW [Data Dictionary]

Input / Output Event	Description	Format / Type
Door O/C Sensor Input (F)	Detects door conditions (Open / Close)	Keyboard Input / U_int
Button A,B Hit Count	Detects A,B button hit count	U_int
Operating Time	Calculates the sum of Button A,B to Time	U_int
Start/Cancel State	State of start/cancel button if pressed	Boolean [start==1, cancel==0]
Door state Output	Door Open/Close State (Button F)	Boolean [open==1, close==0]

DFD Level 3 – MW



Demo in DFD **Level 3** – MW (Viewing Command is used)

```
=====
(조리 중) 00 : 03
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 02
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 01
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 00
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(설정 중) 00 : 00
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
```

```
=====
(문 열림) : 닫혀있음
=====
(설정 중) 00 : 10
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 09
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 08
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 07
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(조리 중) 00 : 06
(설정 모드) Time Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
```

When timer '0',
M.W. End up.



When press Button E
M.W. Start up.

About Door State

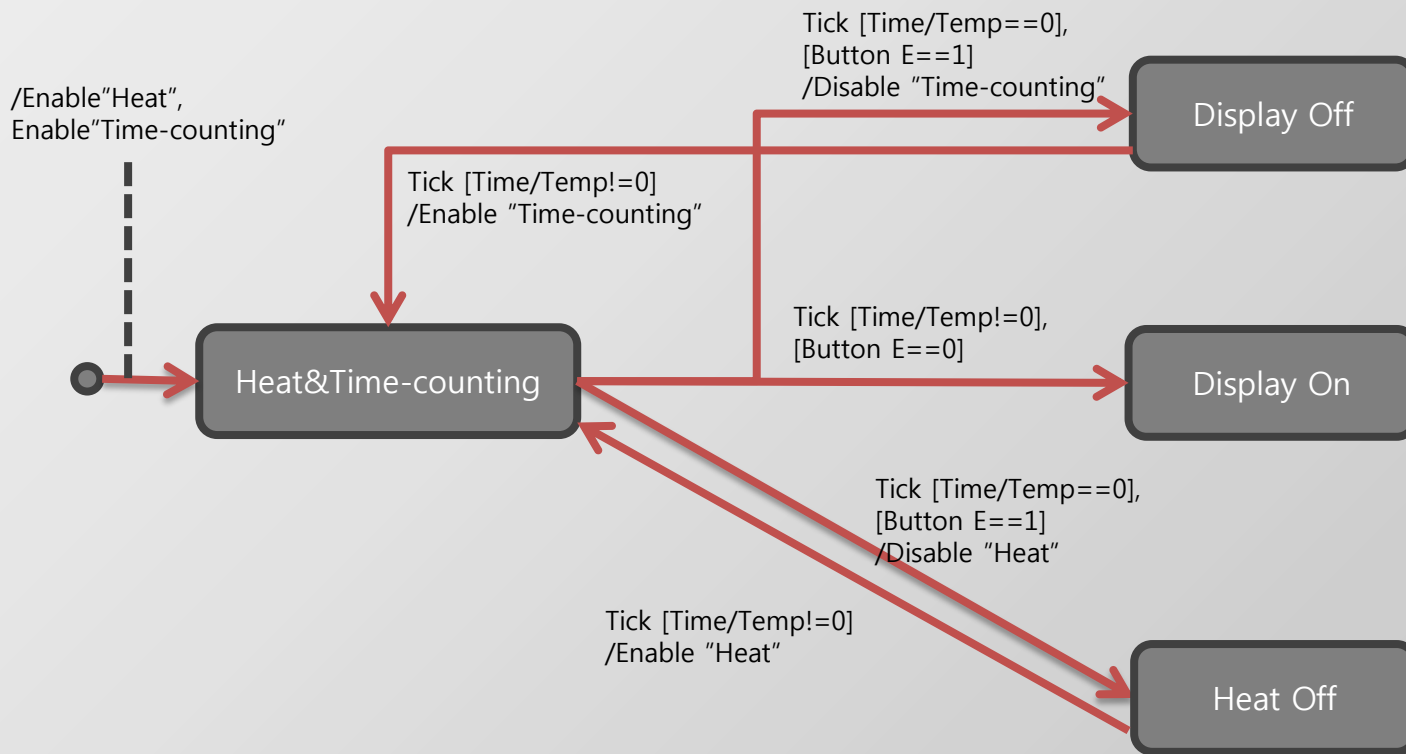


```
=====
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
(설정 중) 20도 : 40도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 열려있음
=====
(설정 중) 20도 : 40도
(설정 모드) Temp Mode
(요리 모드) 00 : Manual
(문 열림) : 닫혀있음
=====
```

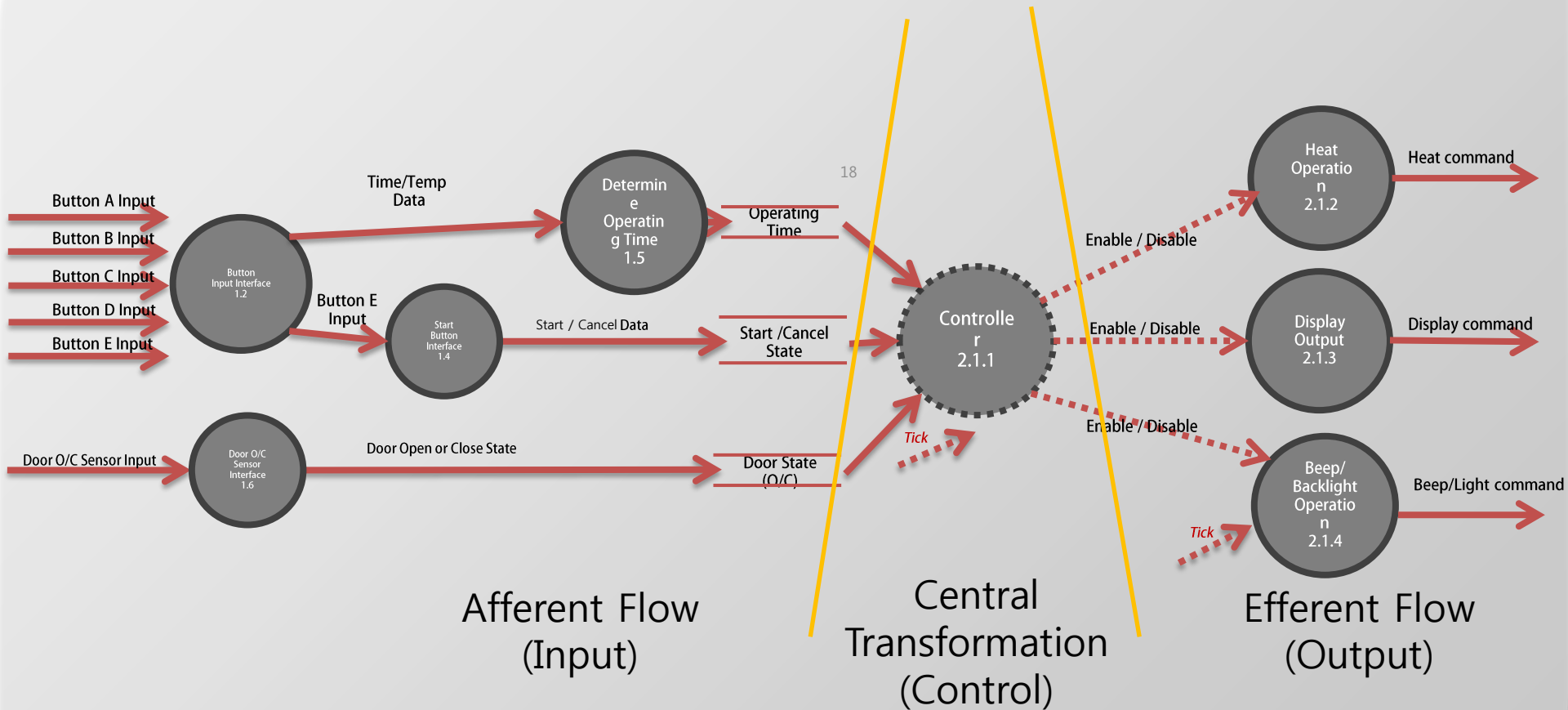
DFD Level 3 – MW [Data Dictionary]

Input / Output Event	Description	Format / Type
Time Tick	[tick = 1 sec] 1 tick 당 1 초로 계산	U_int
Operating Time	Calculates the sum of Button A,B to Time	U_int
Start/Cancel State	State of start/cancel button if pressed	Boolean [start==1, cancel==0]
Door state Output	Door Open/Close State (Button F)	Boolean [open==1, close==0]
Heat command	Sends the final heat command to State Transition Diagram	—
Display command	Sends the final Display command to State Transition Diagram	
Beep/Light command	Sends the final Beep/Light command to State Transition Diagram	

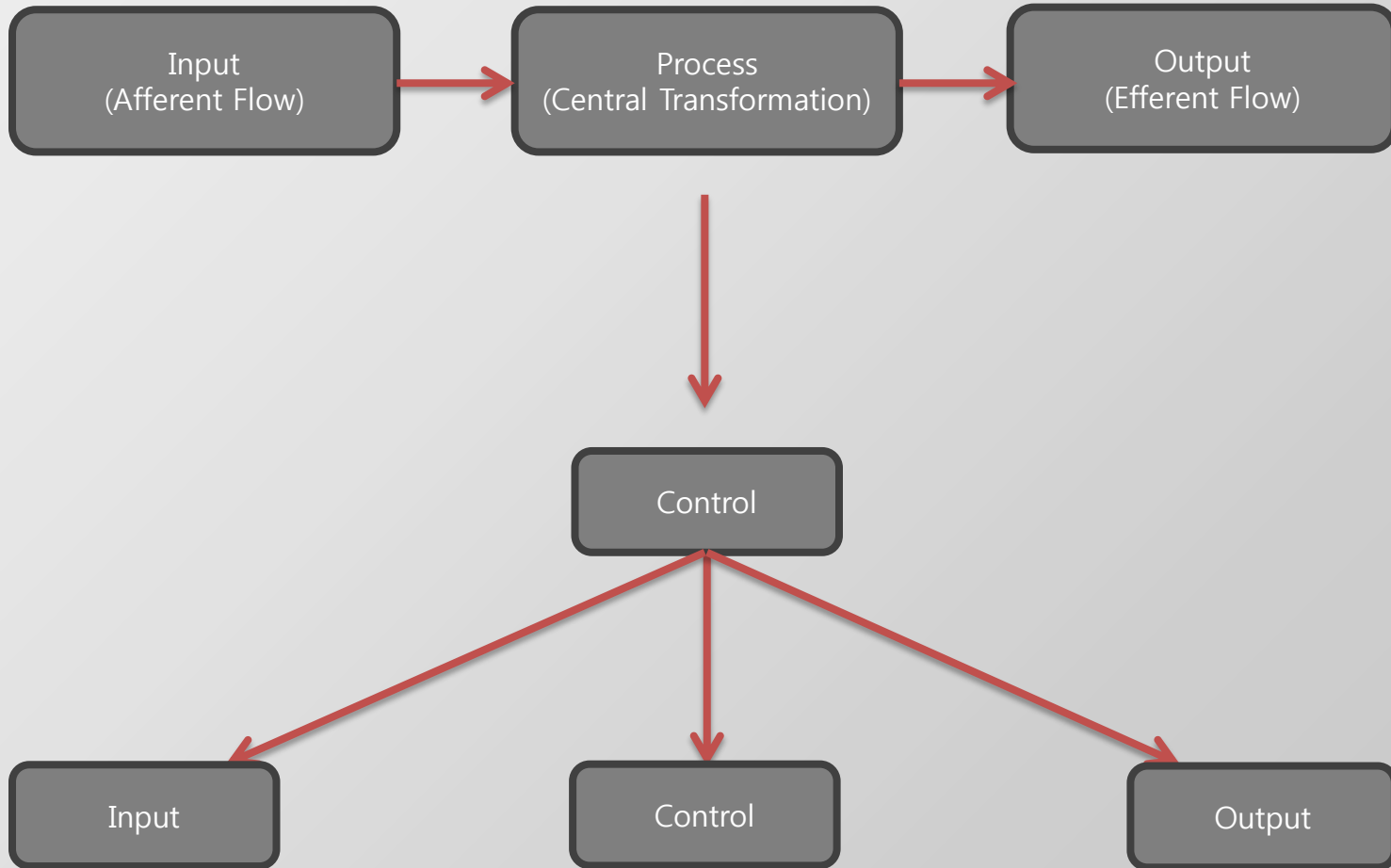
DFD Level 4 – MW (State Transition Diagram)



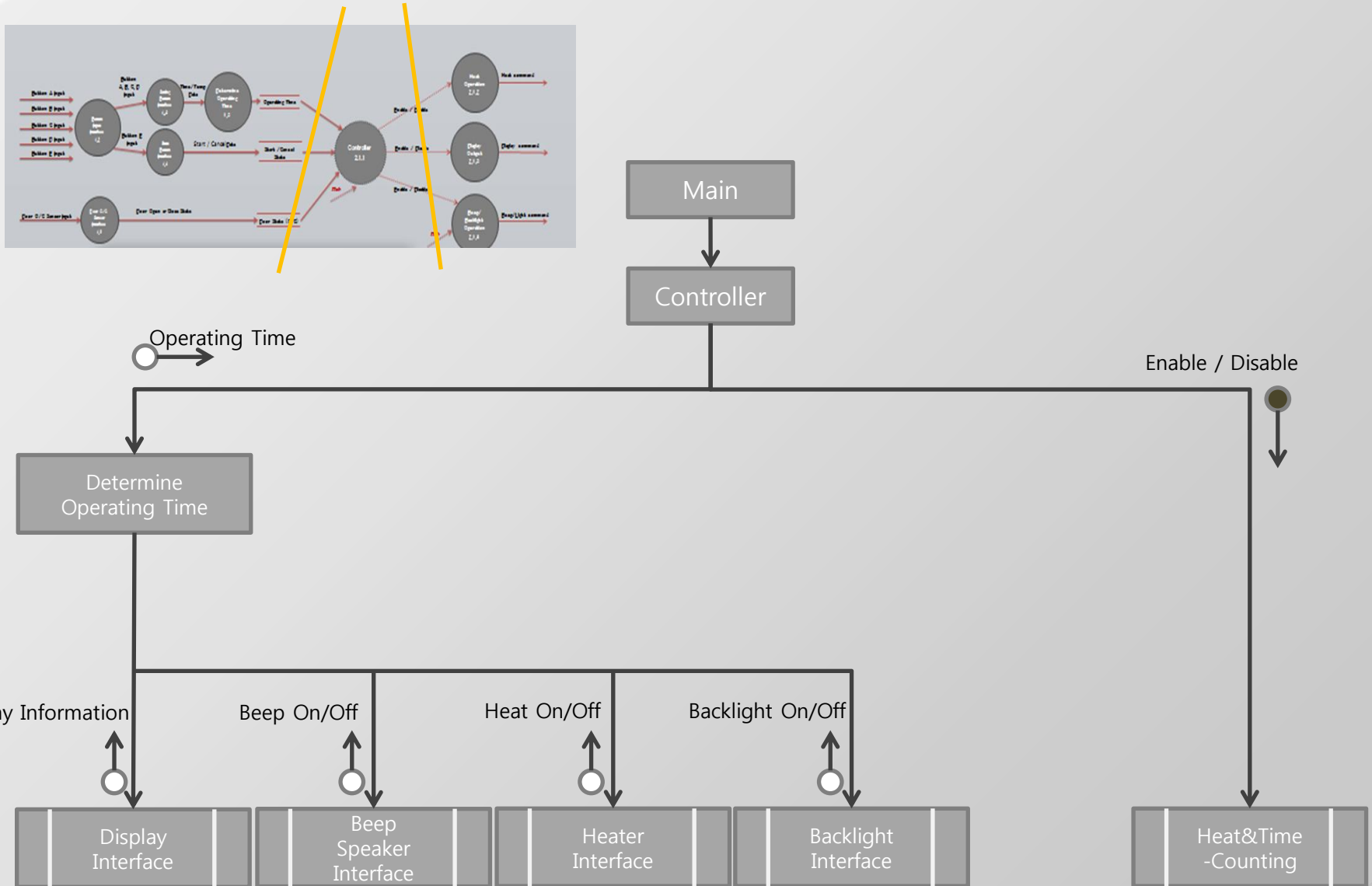
DFD – Micro Wave



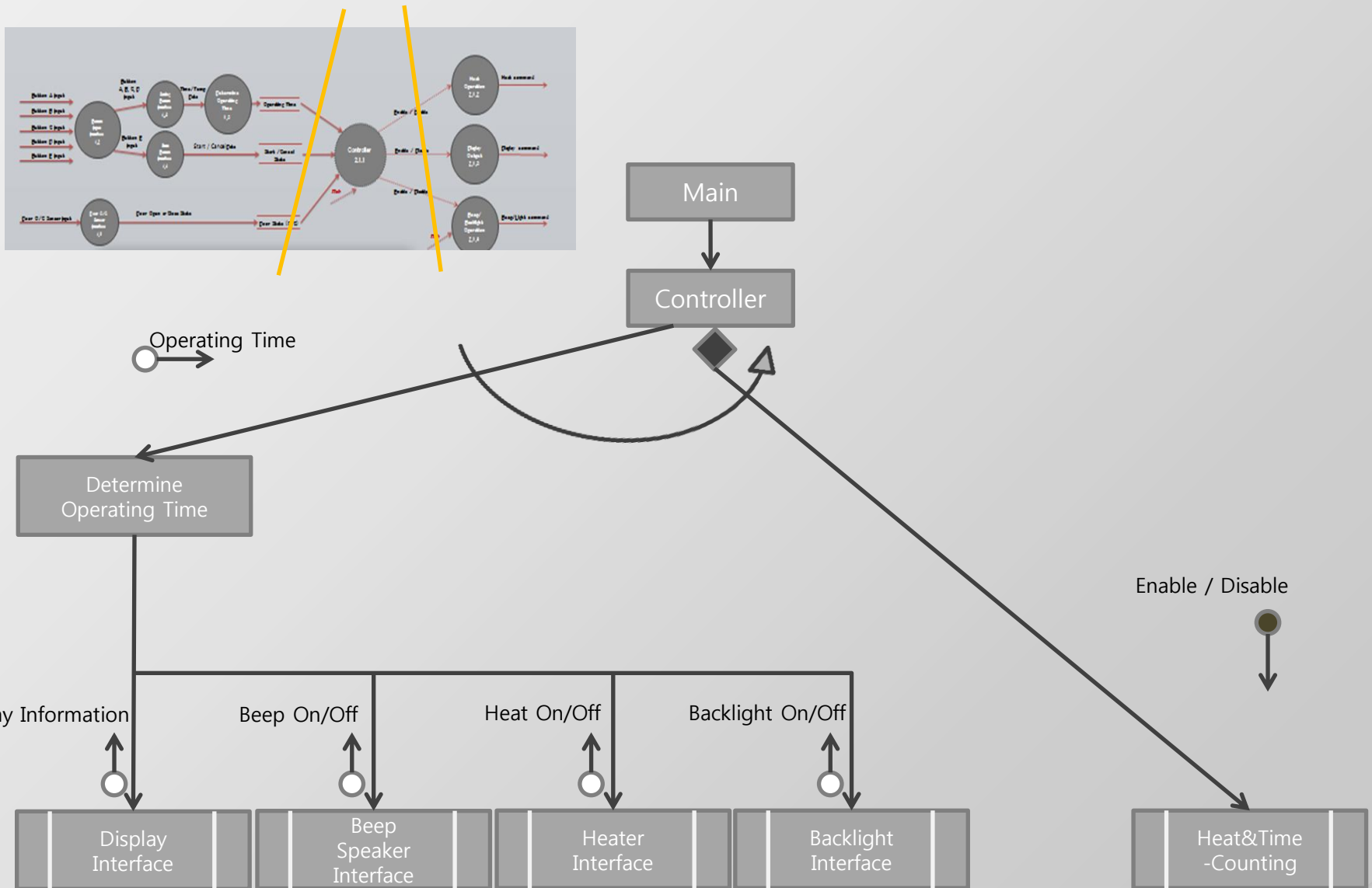
Structured Charts – Micro Wave(Advanced)



Structured Charts – Micro Wave(Basic)



Structured Charts – Micro Wave(Advanced)



Process Specification

Number	1
Name	Time / Temp & Door Detection
Input	Button A, B, C, D, Door O/C Sensor Input, Temp Sensor Input
Output	Time/Temp Setting data, Door State(O/C)
Description	<ol style="list-style-type: none">1. Button A - Add 10 seconds / Add 10 temp2. Button B - Add 30 seconds / Add 20 temp3. Button C - Time/Temp mode change4. Button D - Select mode5. Door O/C Sensor Input – Is open? Close?6. Temp Sensor Input – Is open? Close?

Number	1.2
Name	Button Input Interface
Input	Button A, B, C, D, E
Output	Button A, B, E pressed state
Description	<ol style="list-style-type: none">1. Button A to D - Describe in 'Number 1'2. Button E - Start/Cancel state

Process Specification

Number	1.3
Name	Determine Operation Time
Input	Button A, B Hit Count
Output	Operating Time
Description	Calculate based 'Button A (or B) Hit Count' and determine Total time.

Number	1.4
Name	Start Button Interface
Input	Button E Input
Output	Start/Cancel State
Description	Split 'State of Start/Cancel'

Process Specification

Number	1.5
Name	Door O/C Sensor Interface
Input	Door O/C Sensor Input
Output	Door State(O/C)
Description	Split 'State of Door Open/Close'

Process Specification

Number	2.1.1
Name	Controller
Input	Operating Time, Start/Cancel State, Door State (O/C)
Output	Enable/Disable state of Heat Operation / Display Output / Beep Backlight operation
Description	<ol style="list-style-type: none">1. After 1 tick(1 second), Total Time--2. If Controller receive 'Start state', Give 'Enable Signal' Heat Operation, Display, Backlight Operation.3. If Controller receive 'Cancel State', Give 'Disable Signal' Heat Operation, Display, Backlight Operation.4. If Controller receive 'Open State', Give 'Disable Signal' Heat Operation, Display. But, Give 'Enable Signal' Backlight Operation.5. If Controller receive 'Close State', Give 'Enable Signal' Heat Operation, Display, Backlight Operation.

Number	2.1.2
Name	Heat Operation
Input	Enable/Disable
Output	Heat command
Description	<ol style="list-style-type: none">1. Split Heat command (Heat or not)

Process Specification

Number	2.1.3
Name	Display Output
Input	Enable / Disable
Output	Display Command
Description	1. Split Display command (Displaying or not)

Number	2.1.4
Name	Beep/Backlight Operation
Input	Enable / Disable, tick
Output	Beep/Light command, tick
Description	1. Split Beep/Light command (Operating or not)

Question and Answer