

Control Flow Graph Generator

(SASD Supplement)

- T11 SASD 수정 -

T10

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◆ **Structured Analysis**

- ✓ **Modification of SASD**
- ✓ **Statement of Purpose**
- ✓ **System Context Diagram**
- ✓ **Event List**
- ✓ **DFD(Data Flow Diagram)**
 - Data Dictionary & Storage
 - Process Specification

◆ **Structured Design**

- ✓ **Structured Chart**

Contents.

◆ Structured Analysis

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Modification of SASD

- 1. Event List -Modifying the contents**
- 2. DFD Level 1 – Process hierarchy**
- 3. DFD Level 2 – Modifying the Structure of Process**
- 4. DFD Level 3 – Edge process delete**
- 5. Modifying data dictionary and process specification of Modified Process and structure**

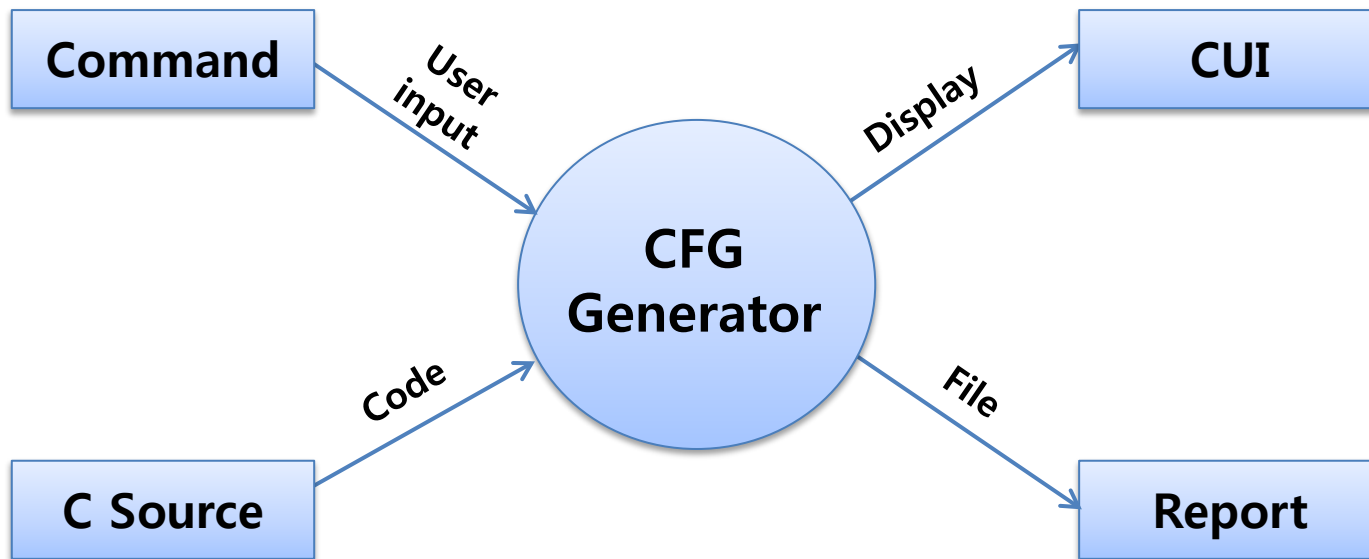
Statement of Purpose

1. Input are the file written by C-language and commands are entered by the user.
2. The output are CUI and report File that holds the information of the CFG.
3. Block C Source files received as input to the divide, this is a program that generates a CFG to Block..
4. Execution of the software is in the form of a Command Line Commands.
5. When you have entered the wrong type of command to output to help.
6. 100 to 200 lines of code size, the program is targeted, code should include Main Function.
7. The code works for a single file. With a user-defined header file is not guaranteed to work for.
8. Do not use the pointer to the code is targeted at.

Statement of Purpose(Cont')

9. Every statement is specified using a number, order of the files that received input are same as Numerical order.
10. Need to process about function calls, for statements, while statements, switch statement
11. Between Block and Block is connected to the appropriate edge
12. CFG is composed of the result of the conversion Report, Block, Edge, Error Message.

System Context Diagram



Event List

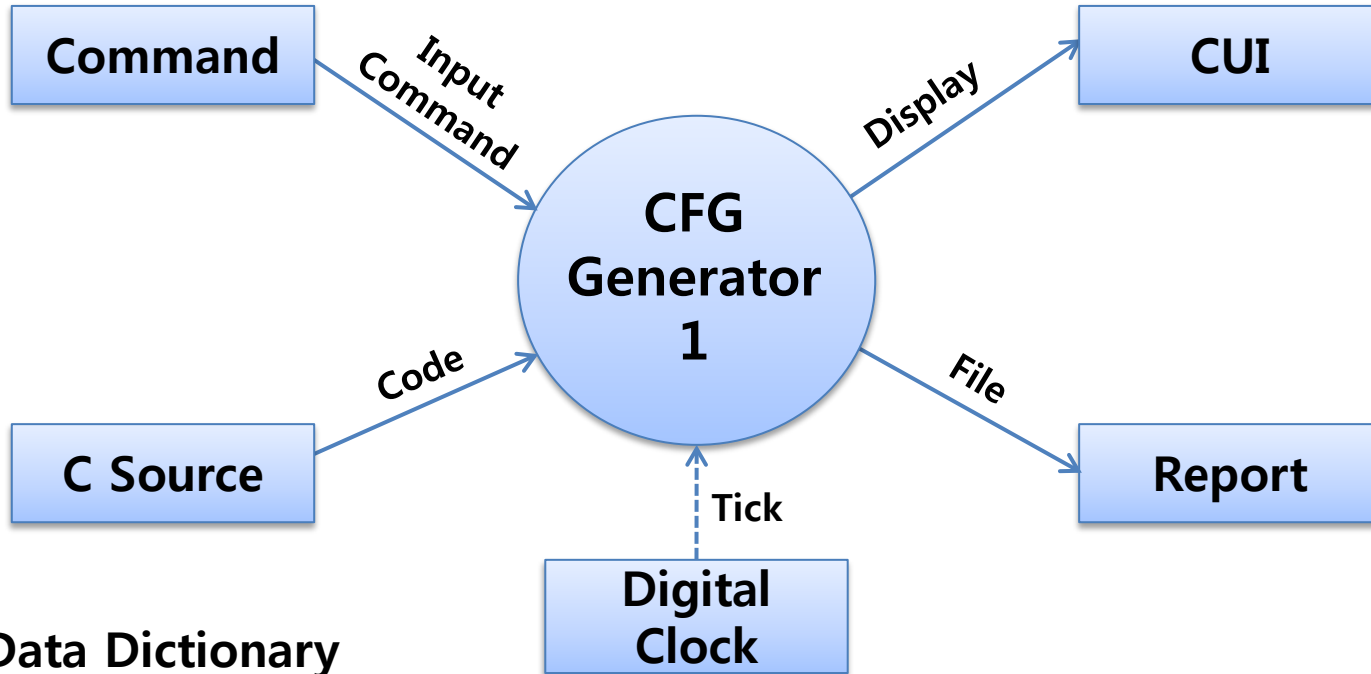
◆ Input Event

Input Event	Description	Format / Type
Code	Successfully of around 100 to 200 lines C Source to work	*.C file
User Input	command of input ex) #gcc ./CG Inputcode.c result.txt	gcc Commands

◆ Output Event

Output Event	Description	Format / Type
Display	The resulting of CFG needs to be output as the CUI	Display
File	the resulting of CFG need to be output in a file	Text file

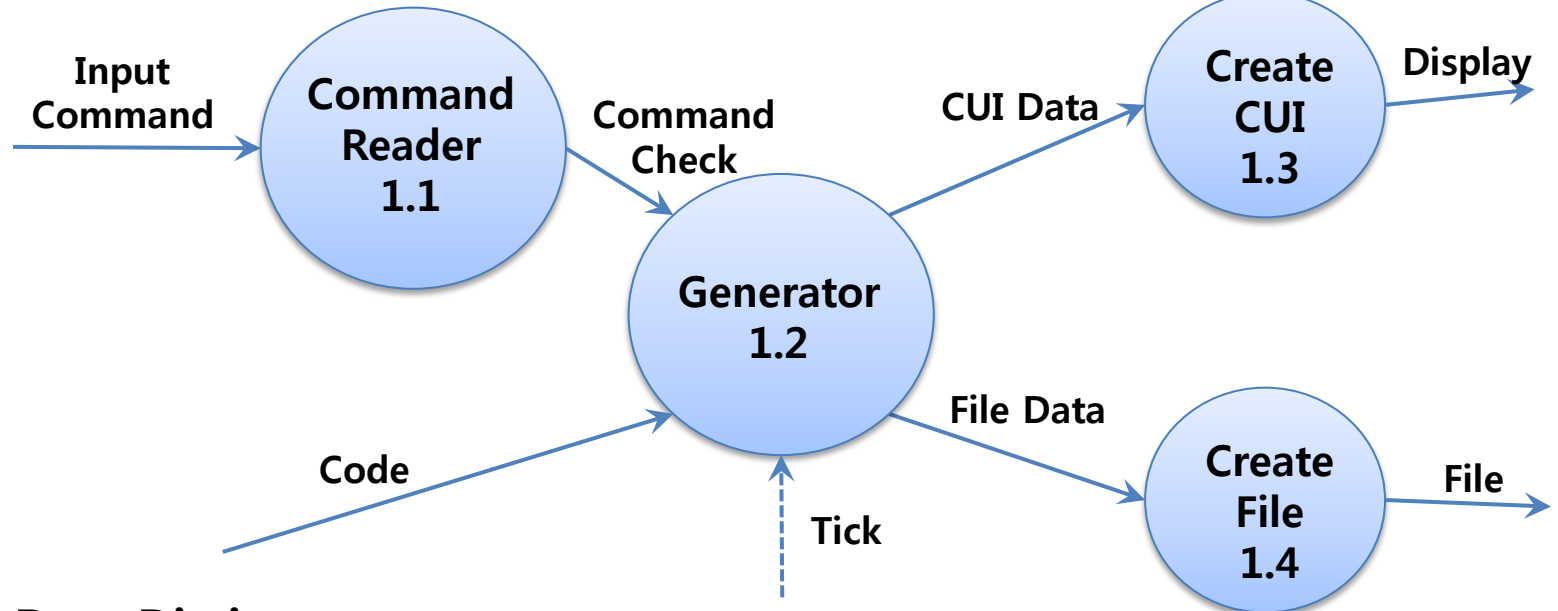
DFD Level 0



◆ Data Dictionary

Data	Description	Format / Type
Input Command	As the user enters a command to the input C Source File of the path to receive and specifies File name to output CFG.	String
Code	C source files to work properly.	*.c
Display	CFG completed output to the console screen.	Console Display
File	Generating the file from completed CFG.	*.txt

DFD Level 1



◆ Data Dictionary

Data	Description	Format / Type
Command Check	Option Values Int type. Determine the suitability of the command is entered. True and False .	FALSE(0) , TRUE(1) / int
CUI Data	Output at the console screen data.(Message, CFG Phase)	String
File Data	Output at file data. (CFG Phase)	String

Process Specification

- DFD Level 1

Reference No.	1.1
Name	Command Reader
Input	Input Command
Output	Command Check
Process Description	When executing the program after receiving the command, the command checks the suitability and conformity to the option value to Int output. The item entered the command are entry c of the input file, the output is a report file name.

Reference No.	1.2
Name	Generator
Input	Command Check, Code
Output	CUI Data, File Data
Process Description	Depending on the results of Command Check reads C-Source, it will output a corresponding message. After converting them to read the source CFG, CUI and File output as a result.

Process Specification

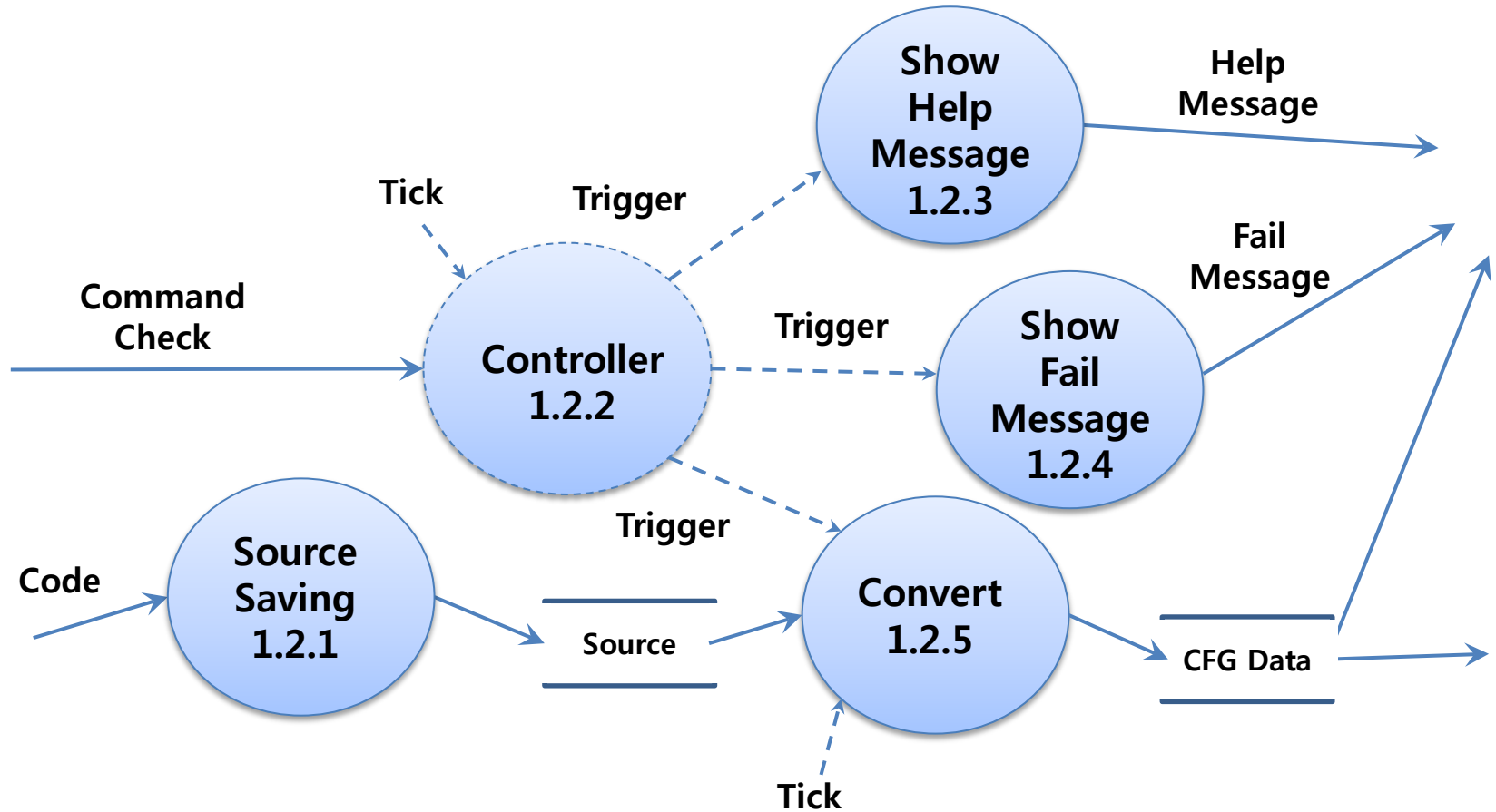
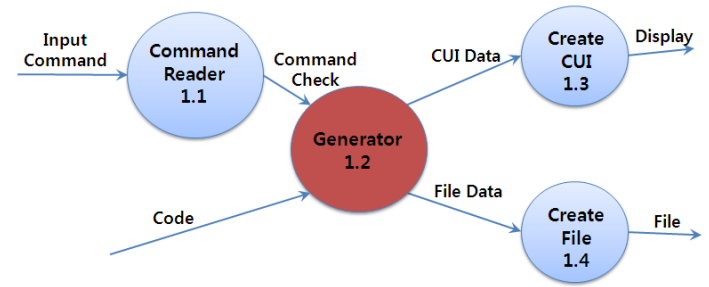
- DFD Level 1

Reference No.	1.3
Name	Create CUI
Input	CUI Data
Output	Display
Process Description	CUI Data received a comprehensive data is output to the console screen. Accordingly to output messages and CFG Phase.

Reference No.	1.4
Name	Create File
Input	File Data
Output	File
Process Description	Received File Data to the combination of CFG Phase output to a file.

DFD Level 2

- Generator



DFD Level 2

- Generator

◆ Data Dictionary

Input Event	Description	Format / Type
Source	Data store saves Transformed Source that transforms the code of Source Saving Code in the process. Data store is This is where stores are converted to CFG Source.	Transformed Source
CFG Data	Data store is stored in unit of information that converted to CFG in Convert process. there is where stores information that has CUI and Flie to output..	CFG Phase
Help Message	Data has the output information from Show Help Message process as CUI.	String
Fail Message	Data has the output information from Show Fail Message process as CUI.	String

Process Specification

- DFD Level 2

Reference No.	1.2.1
Name	Source Saving
Input	Code
Output	Transformed Source
Process Description	Source code that form of *.c file is received, it change source and save at Source Data store for changing CFG.

Reference No.	1.2.2
Name	Controller
Input	Command Check, Tick
Output	Trigger
Process Description	Receive a value of Command Check. Commend input and source input are considered by success or not. And send Trigger at output process that message is needed.

Process Specification

- DFD Level 2

Reference No.	1.2.3
Name	Show Help Message
Input	Trigger, Tick
Output	Help Message
Process Description	When receive Trigger from Controller, send information of help message to process that print CUI.

Reference No.	1.2.4
Name	Show Fail Message
Input	Trigger, Tick
Output	Fail Message
Process Description	When receive Trigger from Controller, send information of failure message that file reading to process that print CUI.

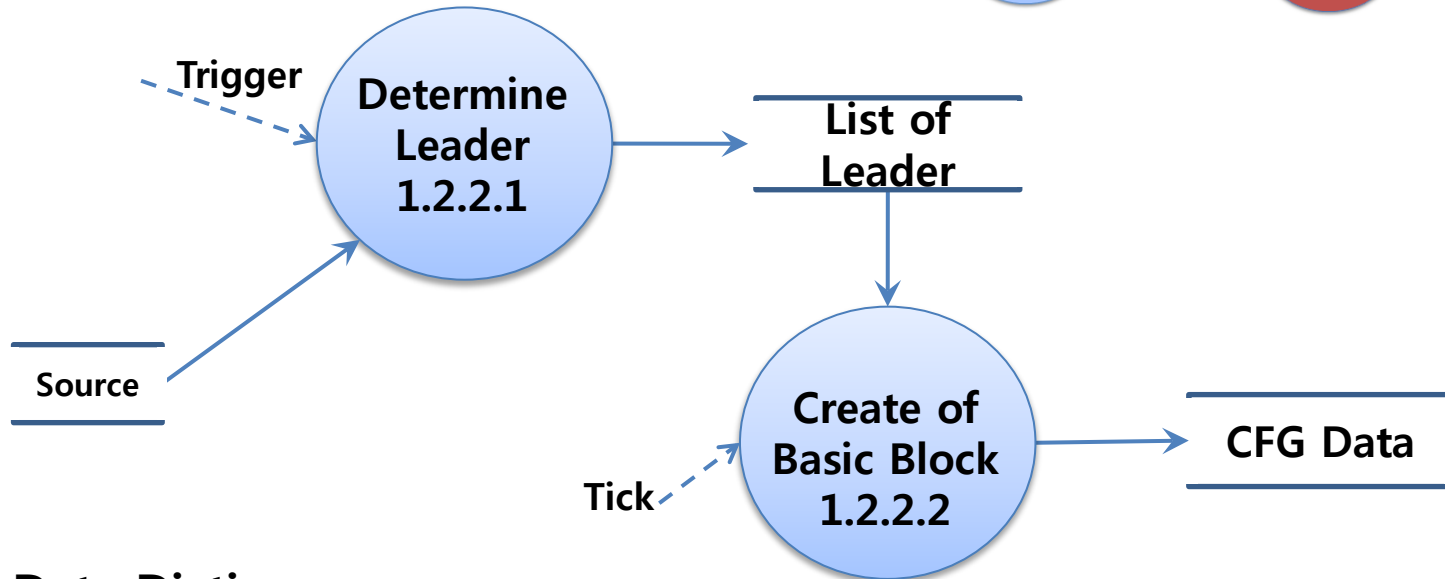
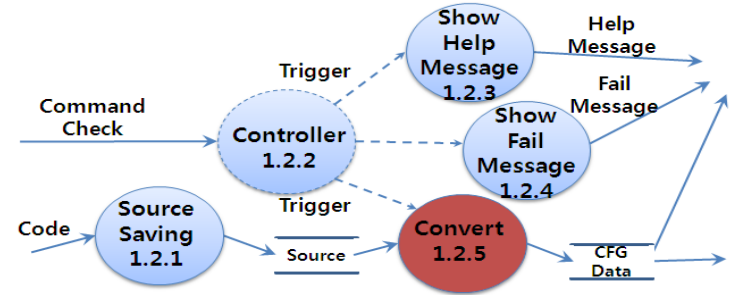
Process Specification

- DFD Level 2

Reference No.	1.2.5
Name	Convert
Input	Trigger, Tick, Transformed Source
Output	CFG Phase
Process Description	When receive Trigger from Controller, receiving an information that changed source change form of CFG from Source Data store. Make a Process that print CUI and File can use that saving a Data in respect of CFG Phase from CFG Data store.

DFD Level 3

- Convert



◆ Data Dictionary

Data	Description	Format / Type
List of Leader	Data store that Data(form of Block) save List at part of Leader.	Structure List

Process Specification

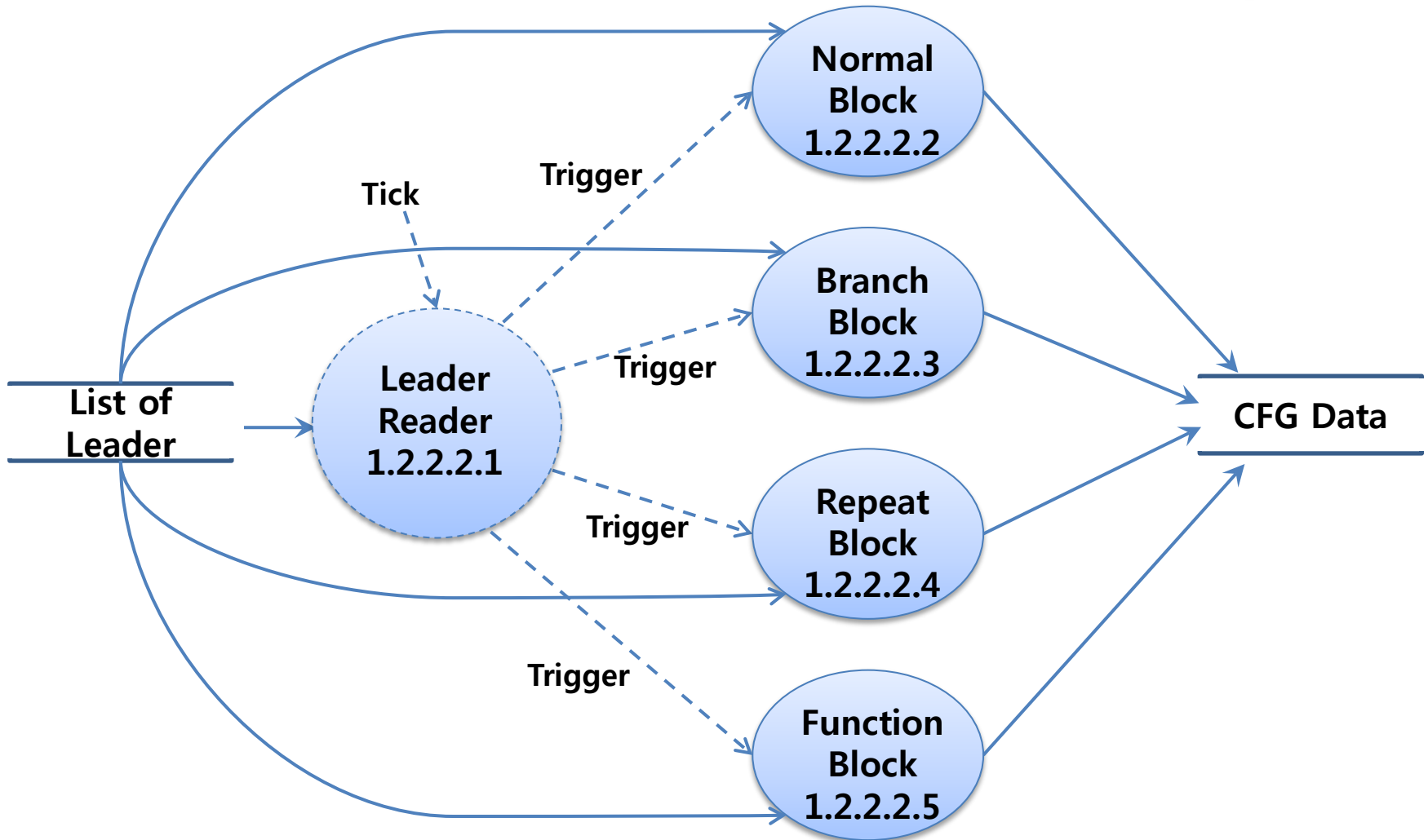
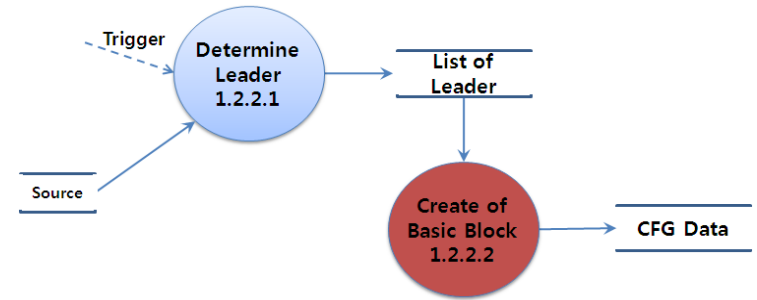
- DFD Level 3

Reference No.	1.2.2.1
Name	Determine Leader
Input	Trigger, Transformed Source
Output	List of Leader
Process Description	When receive a Trigger, read a changed Source and make Leader's list that finding each block's leader, and save a Data store.

Reference No.	1.2.2.2
Name	Create Basic Block
Input	List of Leader, Tick
Output	CFG Phase
Process Description	receive a leader's list, information that making a Block, changing Information, connecting Edge and so on save at CFG Data store.

DFD Level 4.1

- Create of Basic Block



Process Specification

- DFD Level 4

Reference No.	1.2.2.2.1
Name	Leader Reader
Input	List of Leader, Tick
Output	Trigger
Process Description	When you receive a Leader List, each Block processed one by one depending on the type of block to send a trigger where it is needed.

Reference No.	1.2.2.2.2
Name	Normal Block
Input	List of Leader, Trigger
Output	CFG Phase
Process Description	When you receive a Trigger, processing of normal Block and as the form of CFG Phase Data is exported.

Process Specification

- DFD Level 4

Reference No.	1.2.2.2.3
Name	Branch Block
Input	List of Leader, Trigger
Output	CFG Phase
Process Description	When you receive a Trigger, processing of divergence Block and as the form of CFG Phase Data is exported.

Reference No.	1.2.2.2.4
Name	Repeat Block
Input	List of Leader, Trigger
Output	CFG Phase
Process Description	When you receive a trigger, processing of repetition Block and as the form of CFG Phase Data is exported.

Process Specification

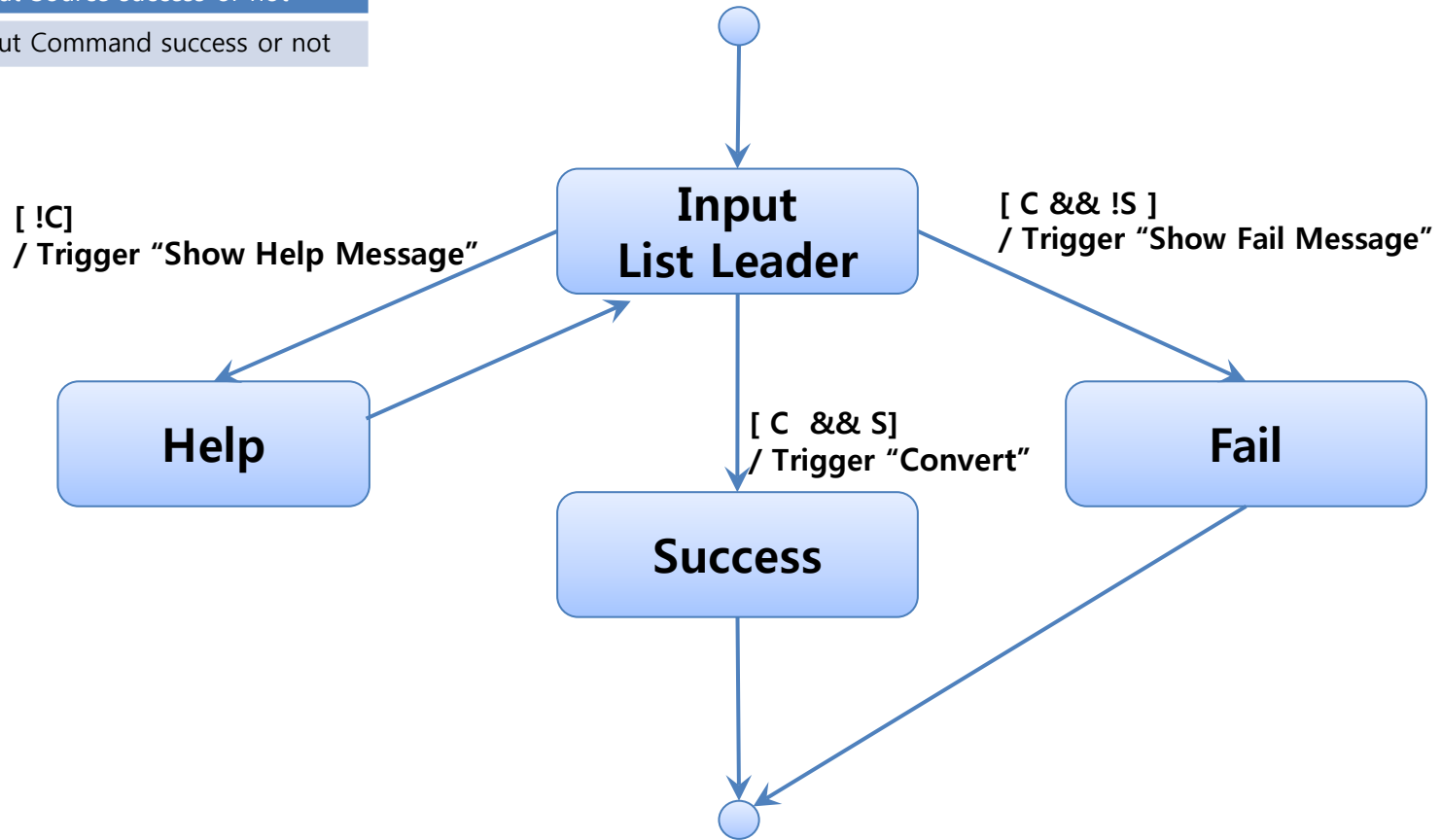
- DFD Level 4

Reference No.	1.2.2.2.5
Name	Function Block
Input	List of Leader, Trigger
Output	CFG Phase
Process Description	When you receive a trigger, processing of the function block and as the form of CFG Phase Data is exported.

DFD Level 5

- Finite State Machine 1.2.2

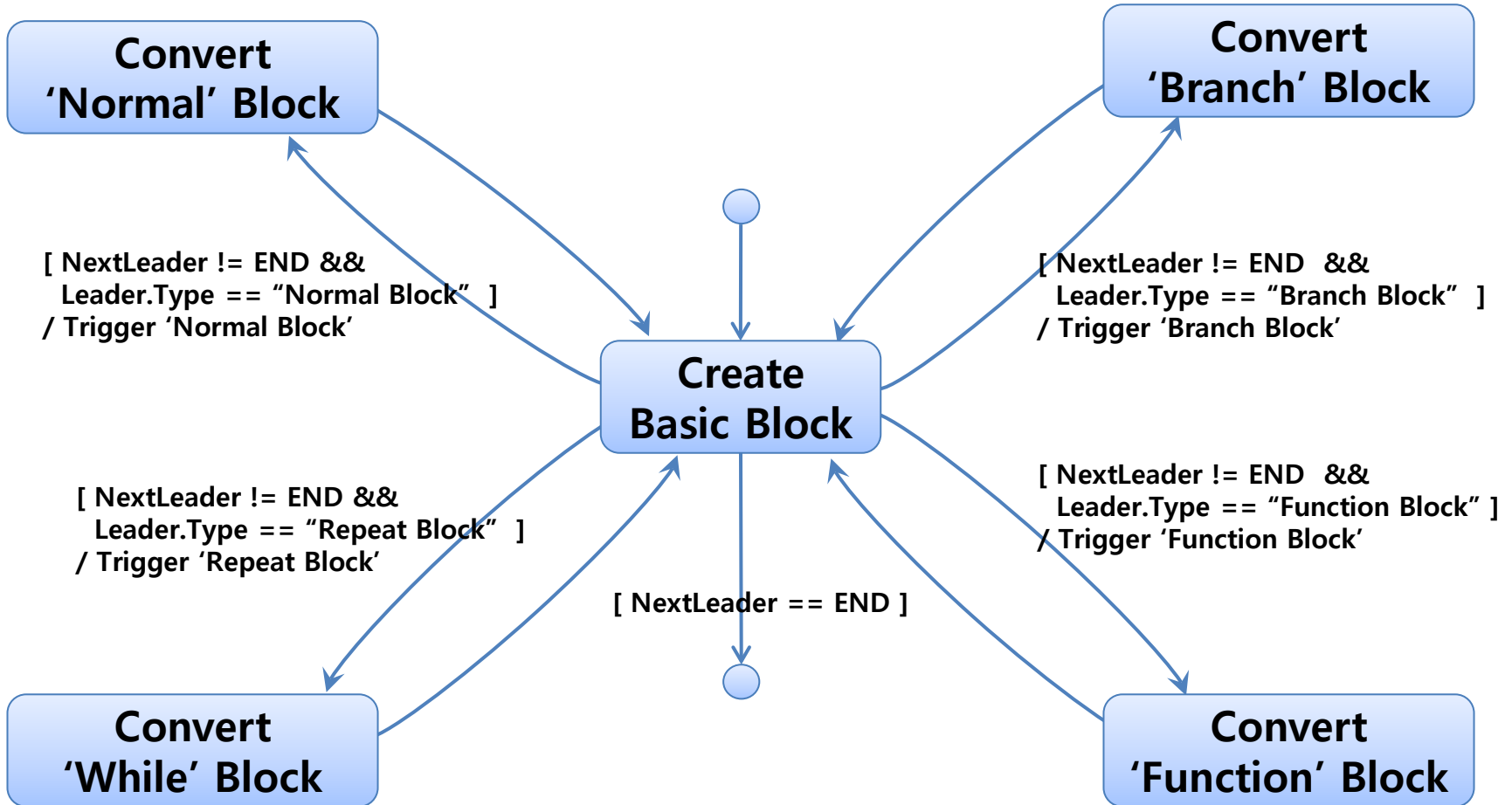
S	Input Source success or not
C	Input Command success or not



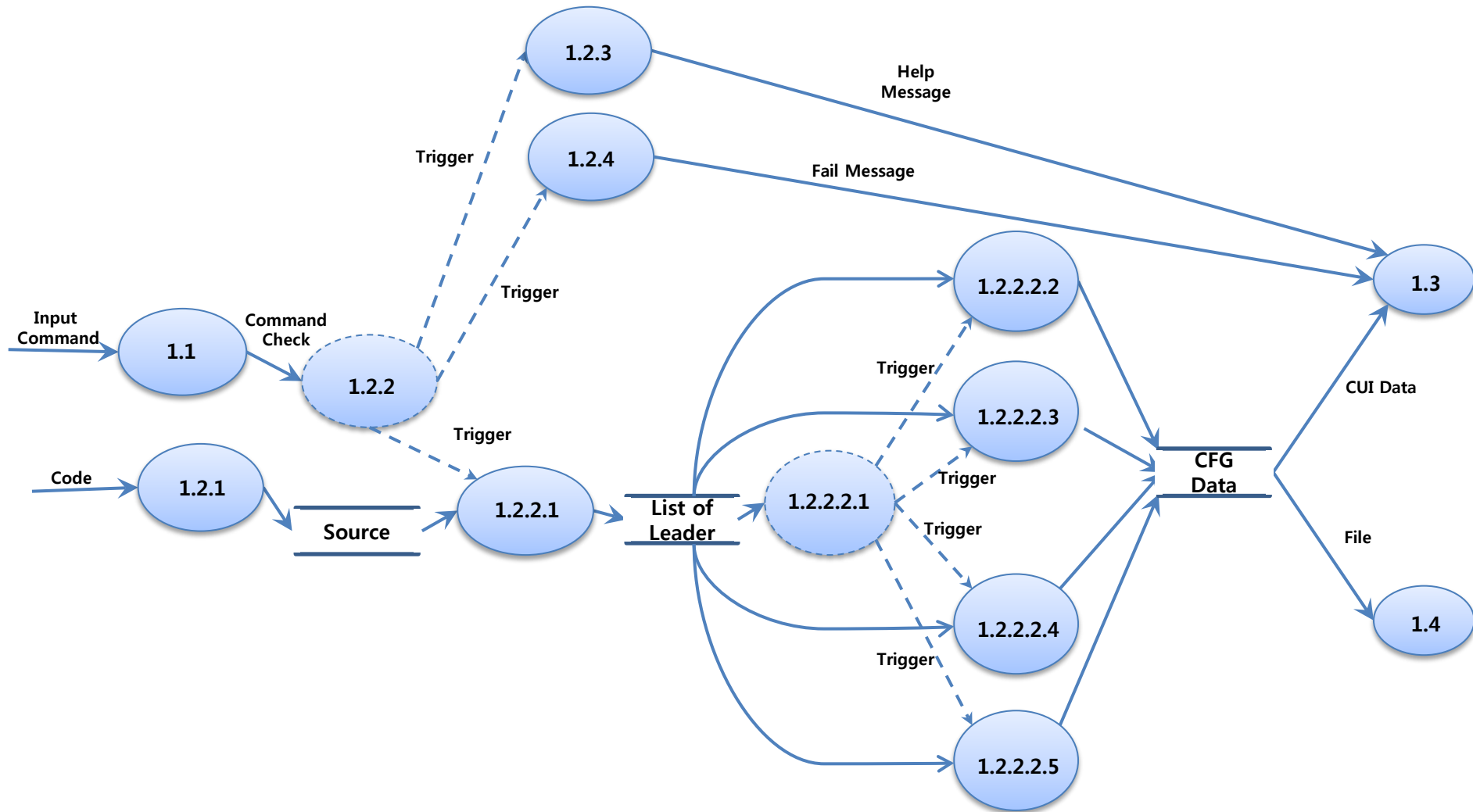
DFD Level 5

- Finite State Machine 2

NextLeader	Connected leader of next block
Leader.Type	Block's Type



DFD - Overall



Contents.

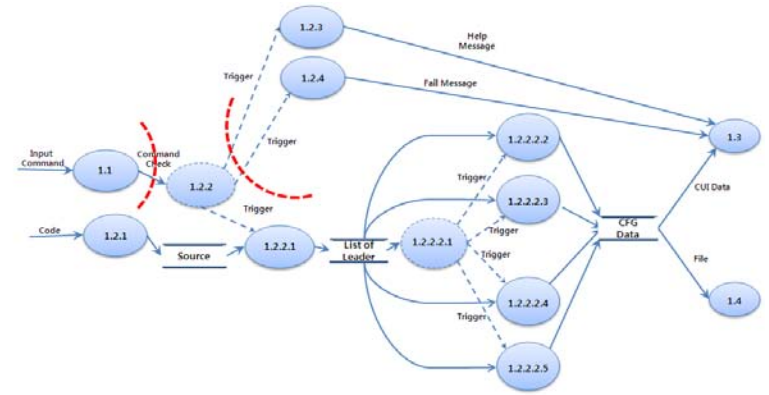
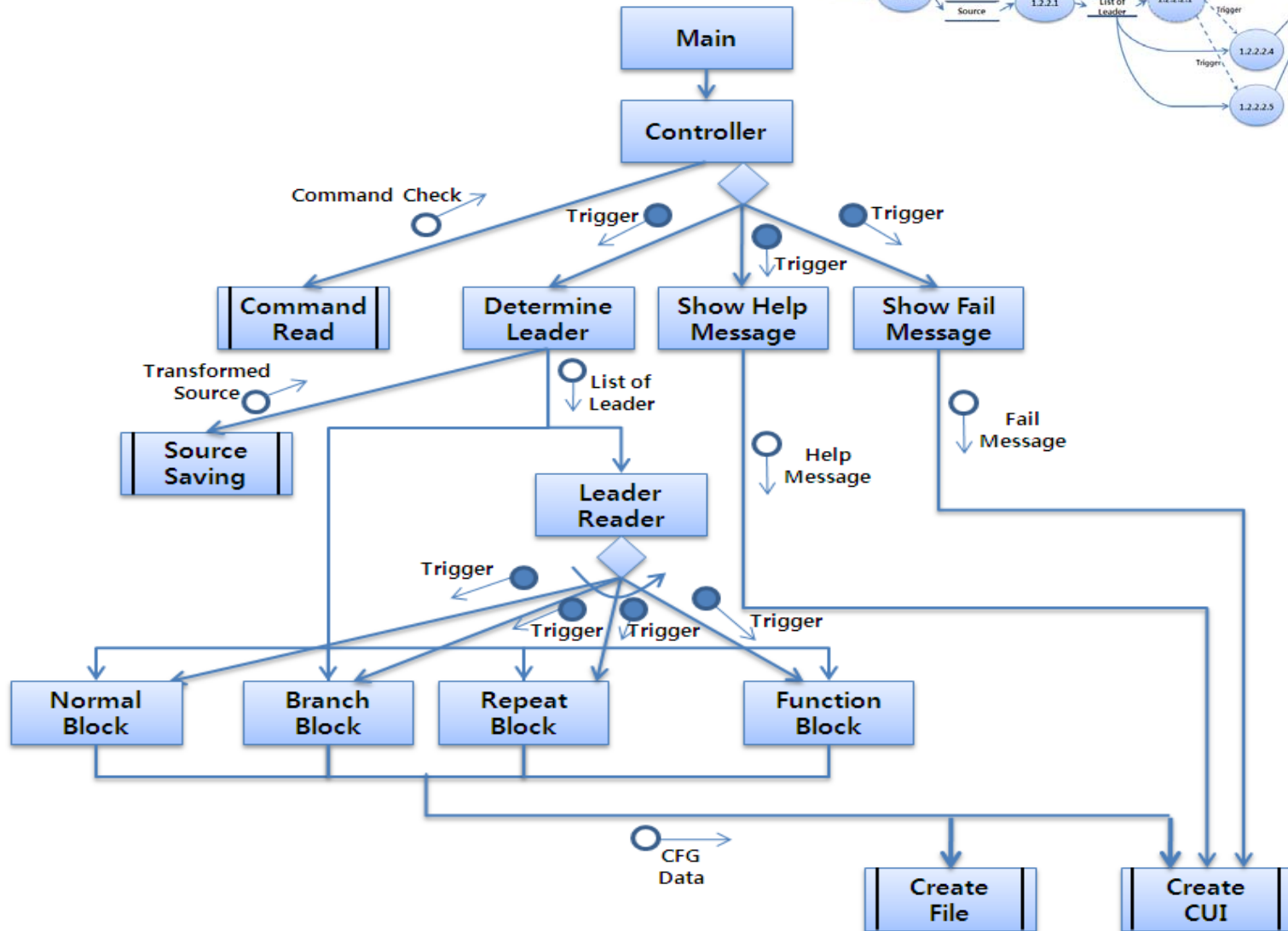
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◆ Structured Design

- ✓ Structured Chart

Structured Chart(Advanced)



References.

◆ Definition of DFD

- **Software Engineering: 구조적 방법론 중심**, 이성구, 2010

◆ Definition of CFG

- **Wikidepia keyword : “Control Flow Graph”**
 - http://en.wikipedia.org/wiki/control_flow_graph
- **Software Visualization** - [Stephan Diehl](#), 2007
 - pp.40 : 3.2.2 Control-Flow graph

◆ Algorithm : Create of CFG

- **Representation and Analysis of Software**
 - Gregg Rothermel, University of Nebraska – Lincoln, January 10, 2005



Thank You!!