TEAM PRESENTATION #4

-CFG GENERATOR

TEAM [T2]

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Project Overview

- We develop the **CFG Generator** based on our 2nd presentation.
- Just like the RVC project, SASD(Structured Analysis and Structured Design) is a main technique in this system development.
- We follow the proposed SRS(Software Requirement Specification).

Contents

- **S**tructured **A**nalysis
  - Environmental Model
    - Statement of Purpose
    - System Context Diagram
    - Event List
  - Behavioral Model
    - Data Flow Diagram
    - Data Dictionary
    - Process Specification
- **S**tructured **D**esign
  - Implementation Model
    - Structured Chart

Environmental Model

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Statement of Purpose (1/2)

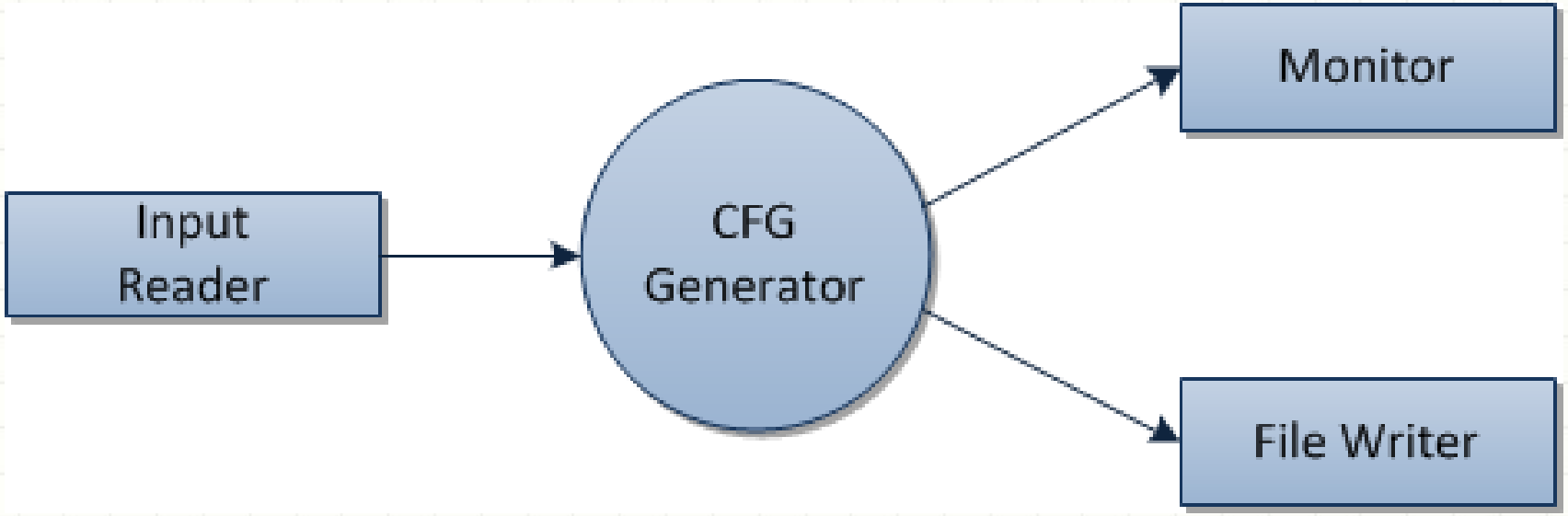
CFG(Control Flow Graph) Generator

- Receiving a C source code, A CFG Generator outputs converted CFG report with a text(*.txt) file.
- The C source code should be convertible code.
  - It has 100~200 lines including main function.
  - It is a single-file that doesn't have user defined header files.
  - It doesn’t include pointers.
- This CFG Generator's execution environment is Cygwin using CUI(Character User Interface), and execution command is $ ./ExecutableFileName CFileName ReportFileName
  - When a user inputted invalid command, the program show *“help”* that includes command syntax.

Statement of Purpose (2/2)

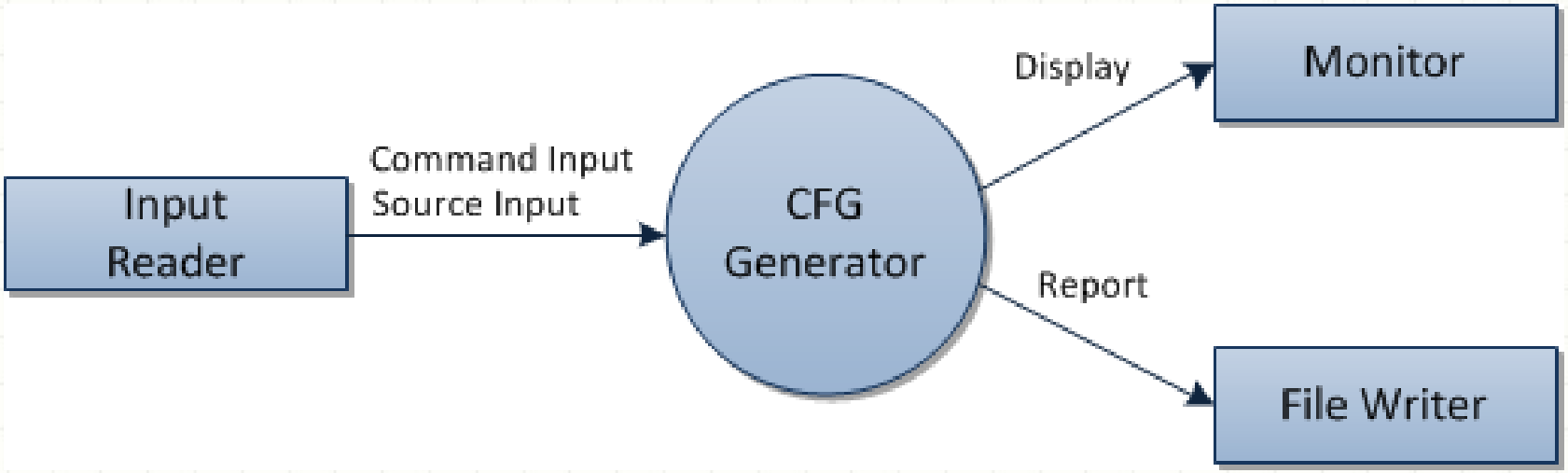
- When C source code inputted successfully, the program shows *"success"* message. Or in error case, the program shows *"error"* and terminates the program.
- Before the program converting CFG, shows *"converting"* message.
- When converting CFG, the program shows execution order of c source code and outputs report file.
  - Converted blocks are printed in a table format having fields :
    [block#] / Type / Line / Description
  - Converted edges are printed in a table format having fields :
    [edge#] / Type / Source block / Destination block
- After report generating process, the program shows the name of report file.
- The program is developed based on SASD.

System Context Diagram



Event List

Input/Output Event	Description
Command Input	Receives a command from ***Input Reader***
Source Input	Receives a C source code from ***Input Reader***
Display	Prints conversions, and system messages to ***Monitor***
Report	Prints table of ‘blocks’ and ‘edges’ of converted CFG to ***File Writer***



Behavioral Model

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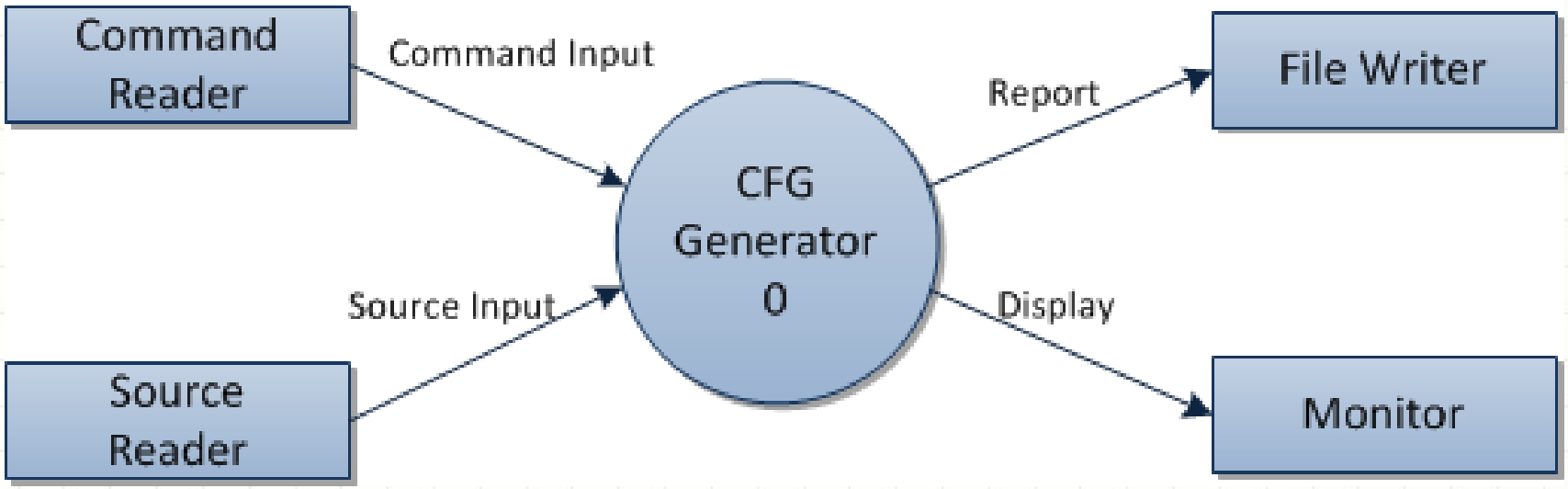
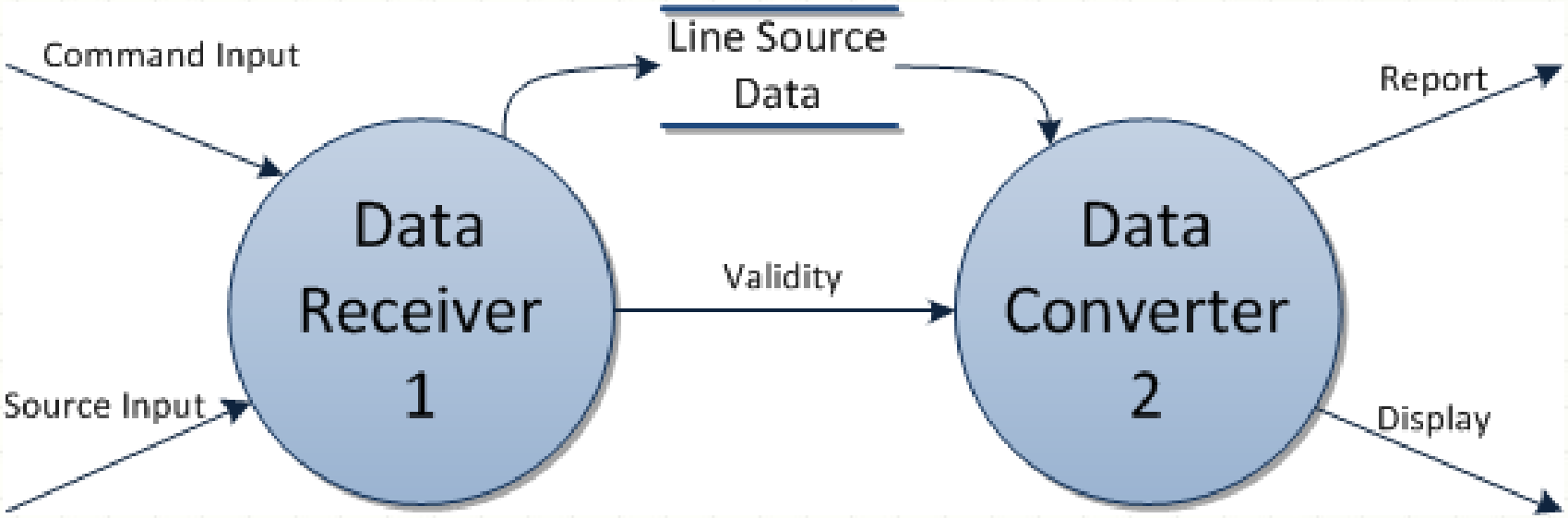
Data Flow Diagram – level 0



Data Flow Diagram – level 1

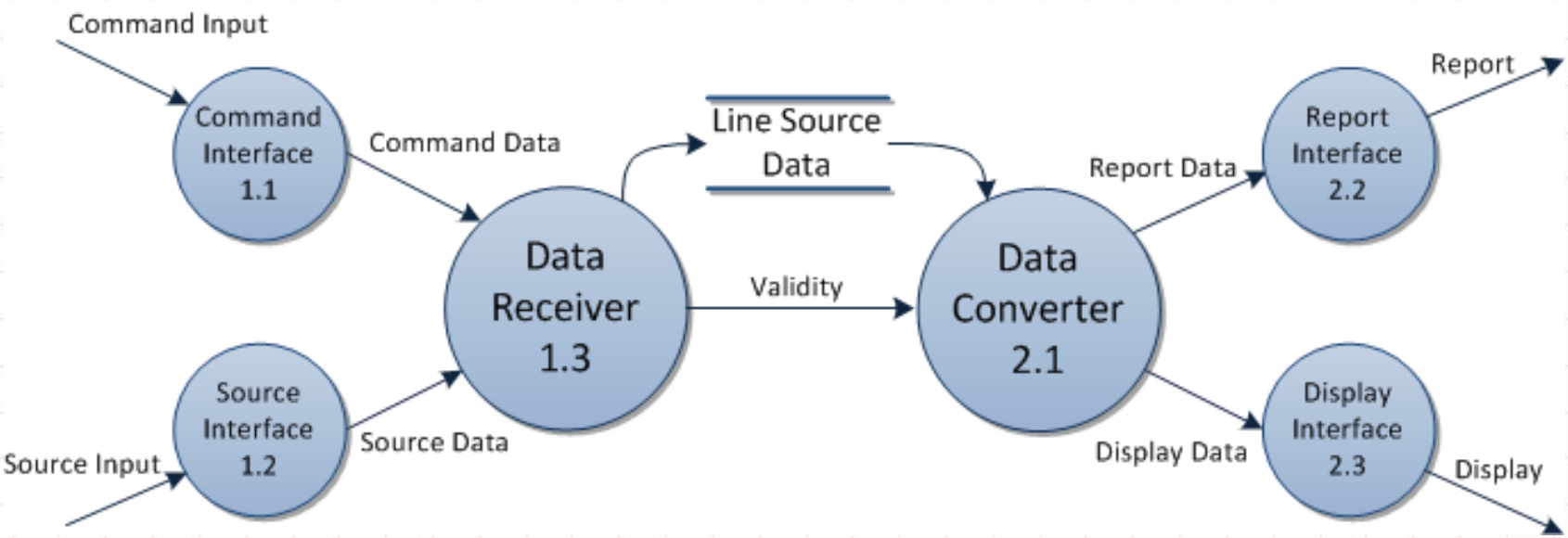


Data Dictionary – level 1

Data name	Description
Command Input	It is received command from ***Command Reader***
Source Input	It is received C source code from ***Source Reader***
Validity	An Integer value which shows states of system (i.e. validation of input data) **0**: ready to parse / **1**: unpermitted command / **2**: invalid filename
Report	It is an output data—table of 'blocks' and 'edges' of converted CFG—being sent to ***File Writer***
Display	It is an output data—conversion information and system messages—being sent to ***Monitor***

Line Source Data	Description
Line Data	It consists of line number and each line of code

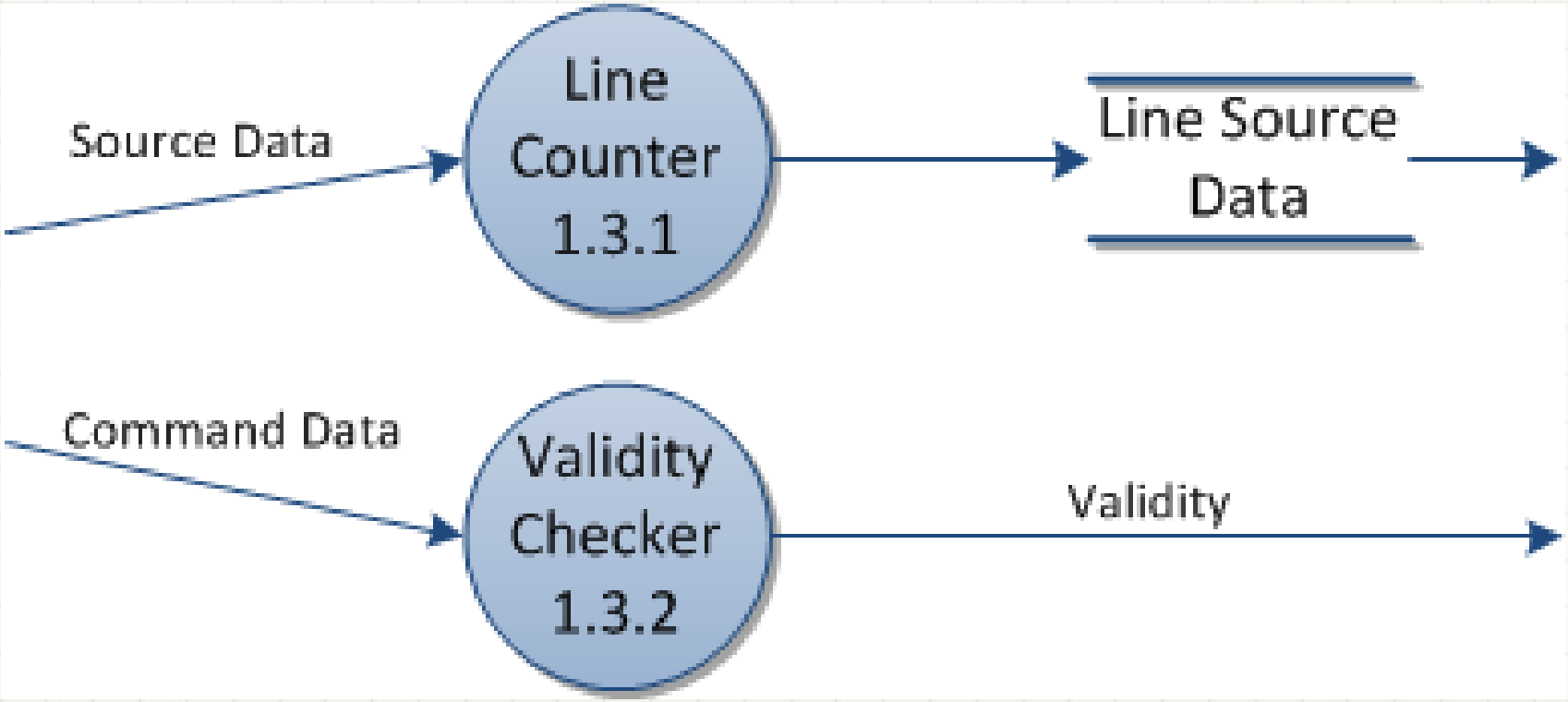
Data Flow Diagram – level 2



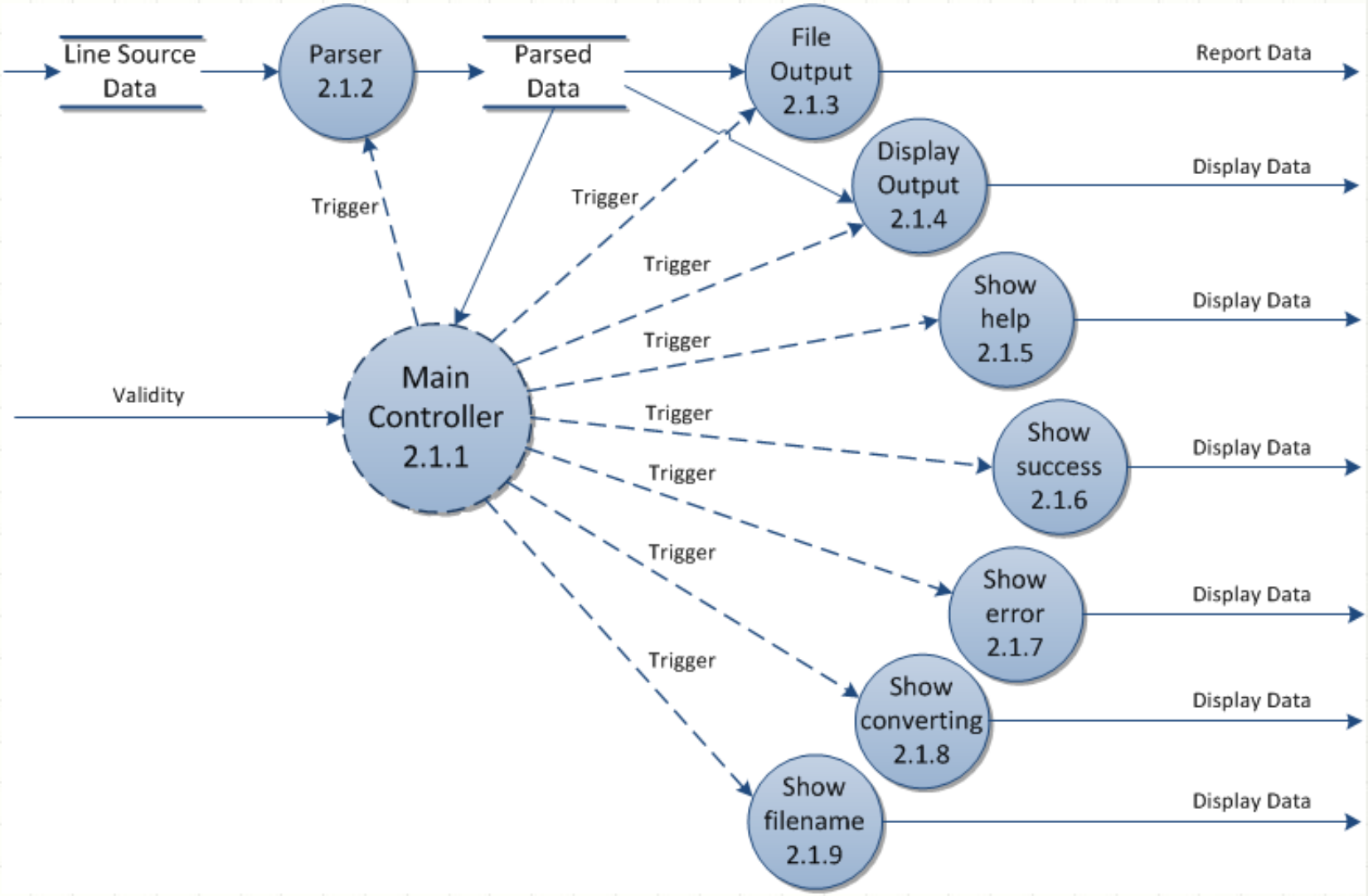
Data Dictionary – level 2

Data name	Description
Command Data	It is a processed data that will have ***Data Receiver*** check validity
Source Data	It is a processed line-by-line source input
Report Data	It is a data generated by system in order to be printed in file after being sent to ***Report Interface***
Display Data	It is a data generated by system in order to be printed on display after being sent to ***Display Interface*** ** It is consist of 'Type' and 'Description' **(Integer / String)** **0** : progress / **1** : help / **2** : success / **3** : error / **4** : converting / **5** : filename

Data Flow Diagram – level 3 (1/2)



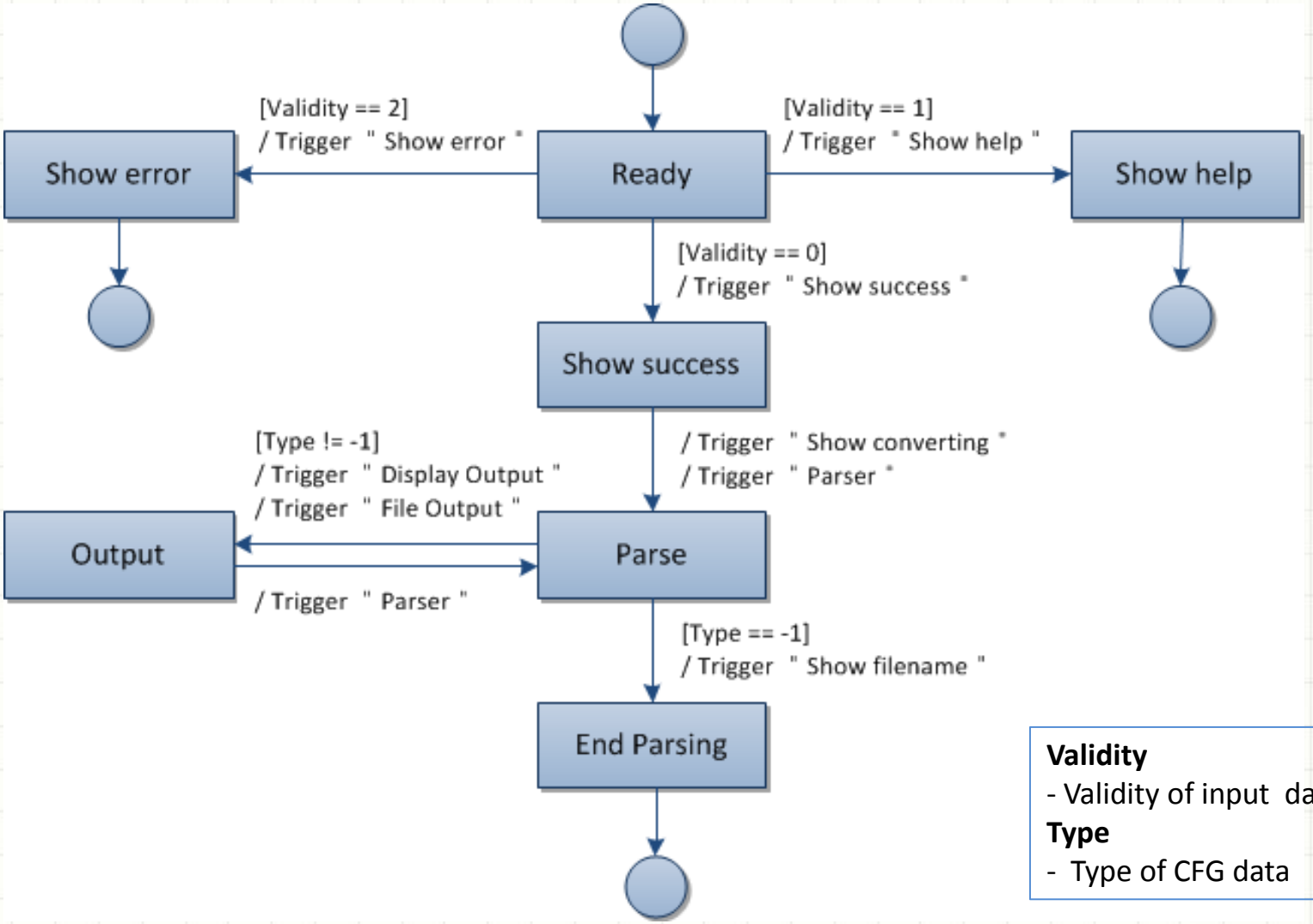
Data Flow Diagram – level 3 (2/2)



Data Dictionary – level3

Parsed Data	Description
CFG Data	*** 'blocks' and 'edges' data of converted CFG by ***Parser*** *** If there is no more data to parse, Type value is set to -1. - Type/Information1/Information2/Information3/Information4/Information5 **(Integer / Integer / Integer / Integer / Integer / String)** Type is (**0**: Block, **1**: Edge, **-1**: None) **[1]** Type == 0 information1 : Block Number information2 : Block Type (**0**: Entry Block / **1**: Exit Block / **2**: Loop Header / **3**: Block of the others) information3 : Start Line Number information4 : End Line Number information5 : Description **[2]** Type == 1 information1 : Edge Number information2 : Edge Type (**0**: Back Edge / **1**: Normal Edge) information3 : Source Block Number information4 : Destination Block Number information5 : Not Used **[3]** Type == -1 All information is not used

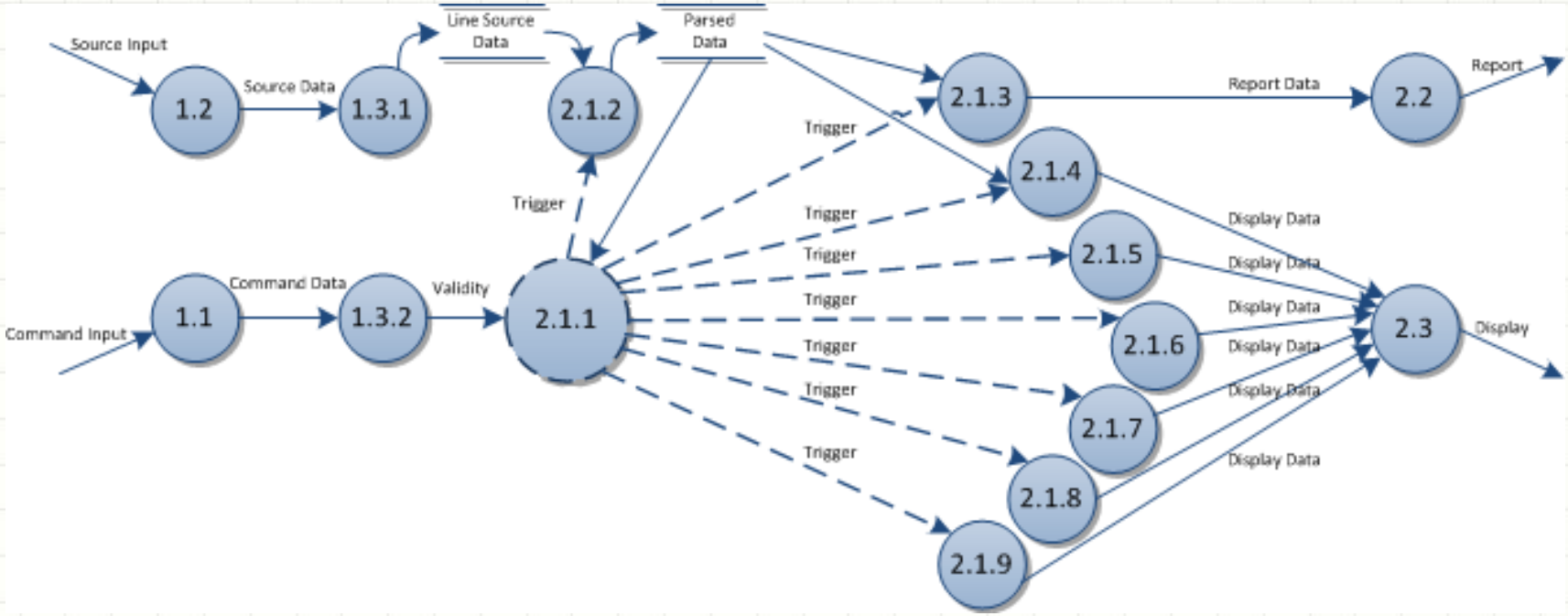
State machine for Main Controller 2.1.1



Validity
- Validity of input data

Type
- Type of CFG data

Data Flow Diagram – Overall



Process Specification

Reference No.	1 . 1
Name	Command Interface
Input	Command Input
Output	Command Data
Process Description	Receives a **Command Input** of the ***Command Reader***, and converts it to **Command Data** that the system can make use of.

Reference No.	1 . 2
Name	Source Interface
Input	Source Input
Output	Source Data
Process Description	Reads a **Source Input** of the ***File Reader*** line by line, and converts it to **Source data**.

Process Specification

Reference No.	1 . 3 . 1
Name	Line Counter
Input	Source Data
Output	Line Data
Process Description	Numbers off the received **Source Data** in order, and saves the data to ***Line Source Data***.

Reference No.	1 . 3 . 2
Name	Validity Checker
Input	Command Data
Output	Validity
Process Description	After Checking format and filename of a received **Command Data**, It assigns an integer validity value into **Validity** and sends the **Validity** to ***Main Controller***.

Process Specification

Reference No.	2 . 1 . 1
Name	Main Controller
Input	Validity, CFG Data
Output	Trigger
Process Description	It is a main controller that determines CFG Generator's state based on inputs (**Validity**, and **CFG Data** in ***Parsed Data***) and then makes CFG Generator command correct action by triggering corresponding process.

Reference No.	2 . 1 . 2
Name	Parser
Input	Line Data, Trigger
Output	CFG Data
Process Description	It parses a received **Line Data** to a **CFG Data** and assigns that into ***Parsed Data***. In the event there's no more data to read, It delivers an integer value **-1** to ***Parsed Data*** in order to inform the ***Main Controller*** of end of parsing.

Process Specification

Reference No.	2 . 1 . 3
Name	File Output
Input	CFG Data, Trigger
Output	Report Data
Process Description	After receiving **CFG Data** from ***Parsed Data***, It Output **Report Data** intended to be printed in file to ***Report Interface***.

Reference No.	2 . 1 . 4
Name	Display Output
Input	CFG Data, Trigger
Output	Display Data
Process Description	After receiving **CFG Data** from ***Parsed Data***, It Output **Display Data** intended to be printed on display to ***Display Interface***.

Process Specification

Reference No.	2 . 1 . 5
Name	Show help
Input	Trigger
Output	Display Data
Process Description	After sending a **Display Data** relevant to *'help'* message(including command syntax) to ***Display Interface***, It terminates the program.

Reference No.	2 . 1 . 6
Name	Show success
Input	Trigger
Output	Display Data
Process Description	It sends a **Display Data** relevant to *"success"* message to ***Display Interface***. Its message means that C source code is inputted successfully.

Process Specification

Reference No.	2 . 1 . 7
Name	Show error
Input	Trigger
Output	Display Data
Process Description	After sending a **Display Data** relevant to *"error"* message to ***Display Interface***, It terminates the program. Its message means that C source code is not inputted successfully.

Reference No.	2 . 1 . 8
Name	Show converting
Input	Trigger
Output	Display Data
Process Description	It sends a **Display Data** relevant to *"converting"* message to ***Display Interface***. Its message means starting conversion.

Process Specification

Reference No.	2 . 1 . 9
Name	Show filename
Input	Trigger
Output	Display Data
Process Description	After sending a **Display Data** including the name of report file to ***Display Interface***, It terminates the program.

Reference No.	2 . 2
Name	Report Interface
Input	Report Data
Output	Report
Process Description	After receiving all **Report Data**, It sorts all ‘blocks’ and ‘edges’ of data in control flow order and assigns it into **Report**. It enables CFG Generator to report with a text file by sending **Report** to ***File Writer***.

Process Specification

Reference No.	2 . 3
Name	Display Interface
Input	Display Data
Output	Display
Process Description	Sends a **Display** which is converted in the practical form from a received **Display Data** to ***Monitor*** in order to print a data immediately on display according to **Display Data**'s data type.

Implementation Model

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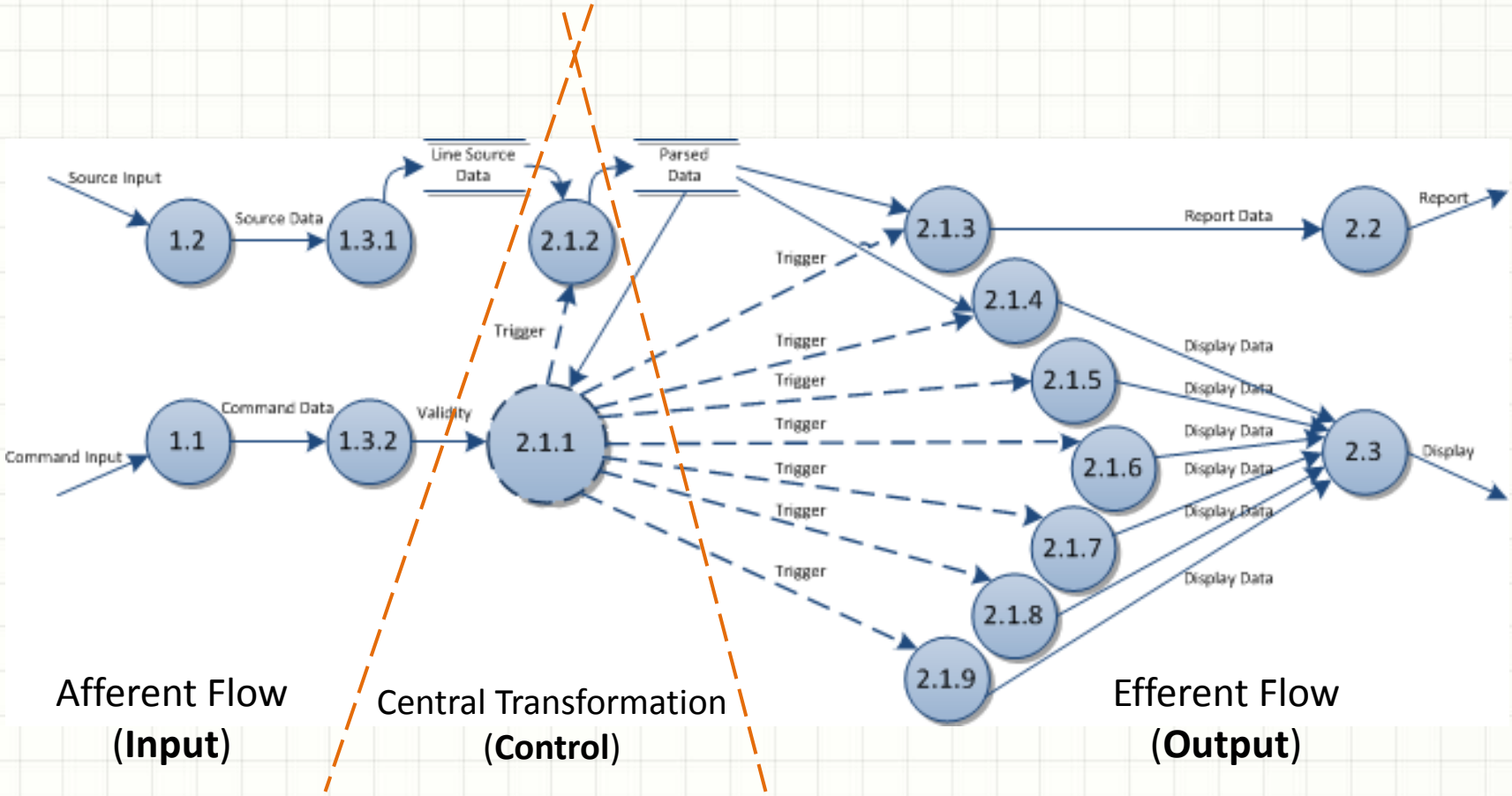
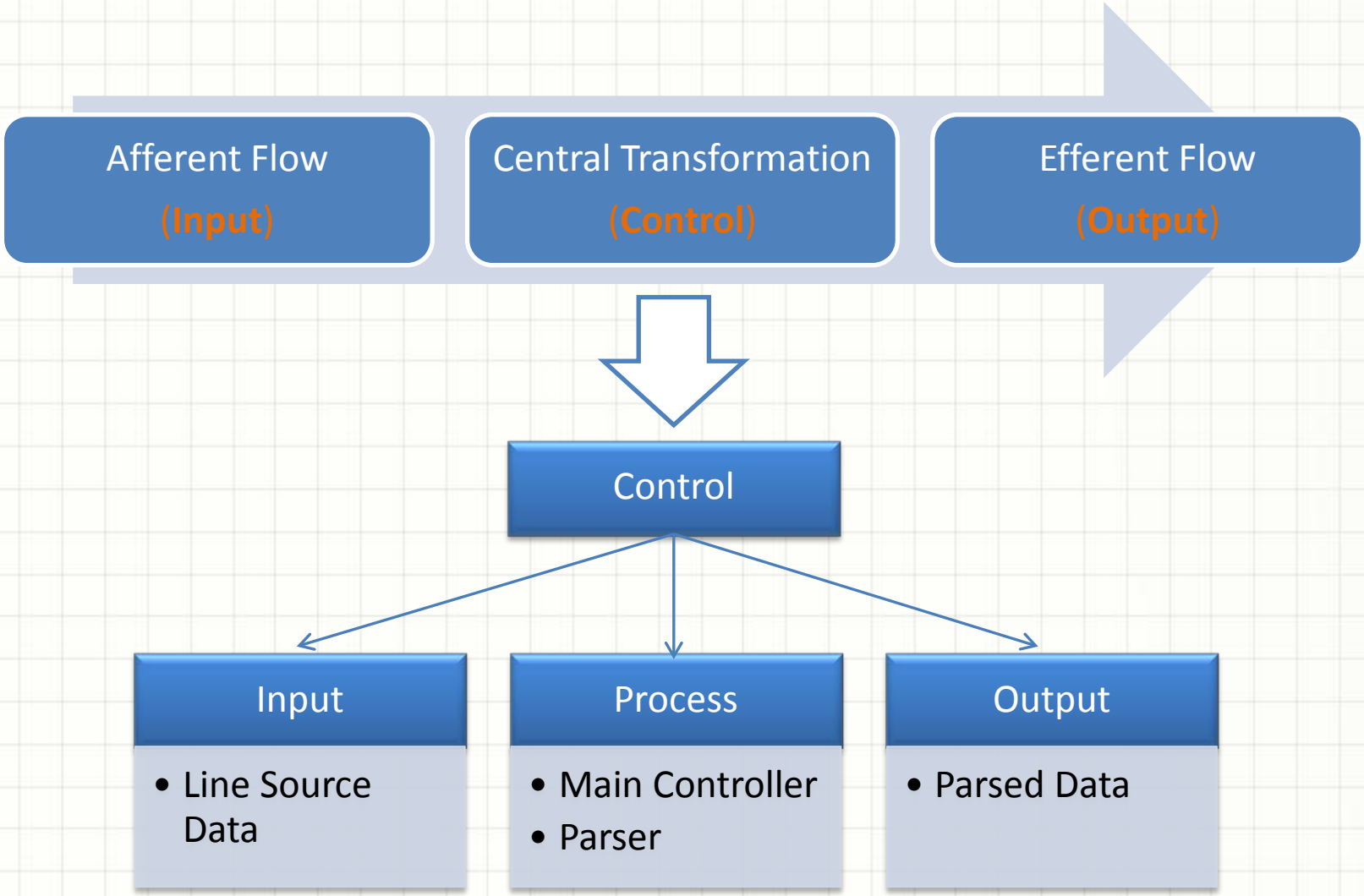
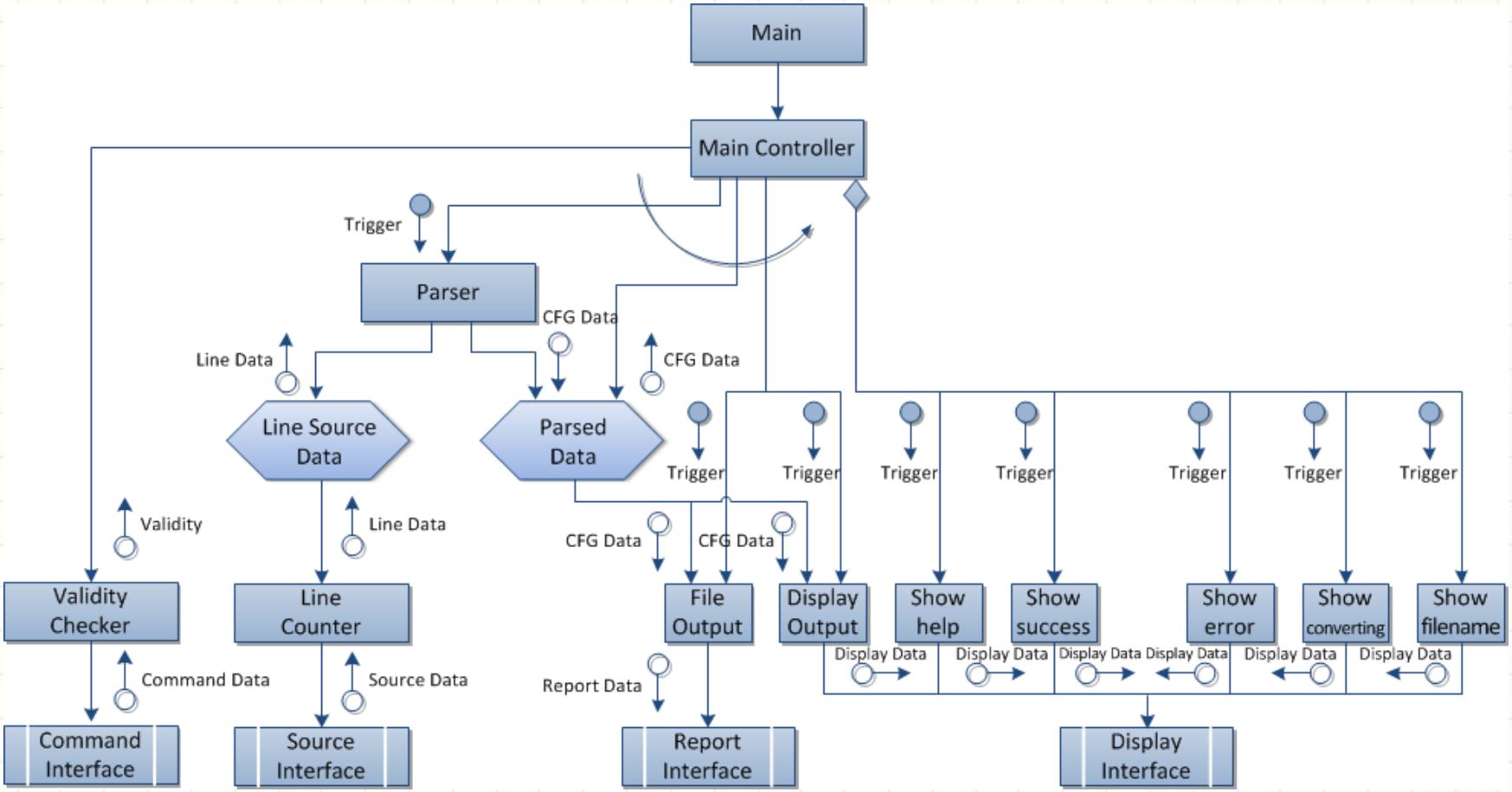
Structured Chart – Transform Analysis



Structured Chart – Transform Analysis



Structured Chart – CFG Generator



Structured Chart – Data Definition

Data name	Description
Command Data	It is a processed data that will have ***Validity Checker*** check validity
Source Data	It is a processed line-by-line source input
Validity	An Integer value which shows states of system (i.e. validation of input data) **0**: ready to parse / **1**: unpermitted command / **2**: invalid filename
Line Data	It consists of line number and each line of code
CFG Data	'blocks' and 'edges' data of converted CFG
Report Data	It is a data generated by system in order to be printed in file after being sent to ***Report Interface***
Display Data	It is a data generated by system in order to be printed on display after being sent to ***Display Interface*** ** It is consist of 'Type' and 'Description' **(Integer / String)** **0** : progress / **1** : help / **2** : success / **3** : error / **4** : converting / **5** : filename

QUESTIONS ?

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