

Team Presentation #5

- CFG Generator

TEAM [T2]

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Project Overview

- ◉ First we take and analyze the team T5's project.
- ◉ If necessary, we have to modify and supplement it. (we will mark red)
- ◉ we do this project with the purpose of final implementation.

Contents

◎ Structured Analysis

> Environmental Model

- Statement of Purpose
- System Context Diagram
- Event List

> Behavioral Model

- Data Flow Diagram
- Data Dictionary
- Process Specification

◎ Structured Design

> Implementation Model

- Structured Chart


Environmental Model

Statement of Purpose [1/2]

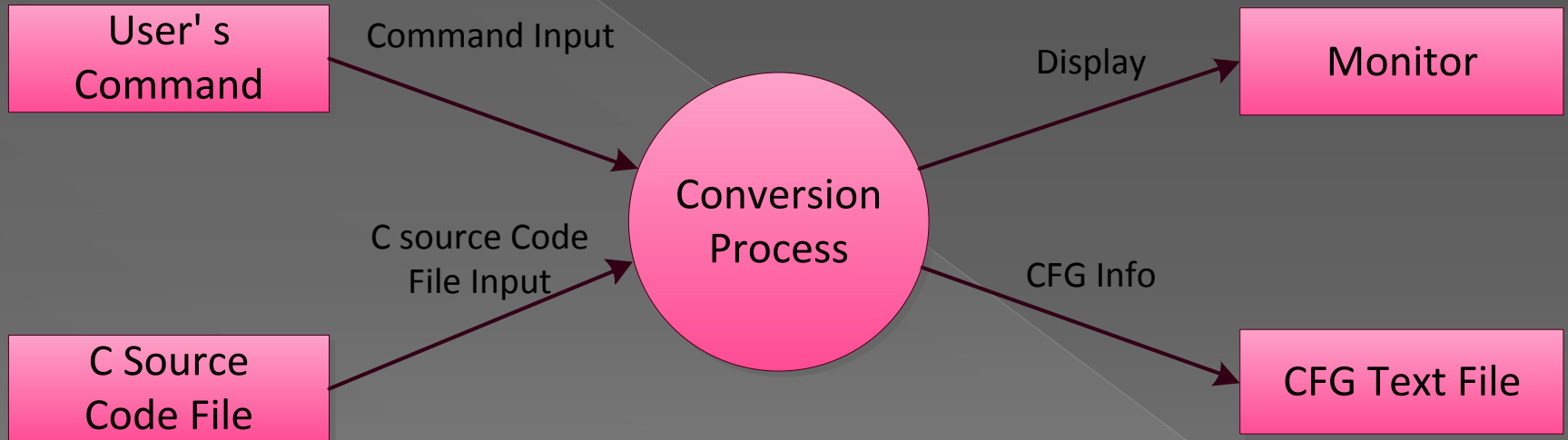
CFG(Control Flow Graph) Generator

- Convert a C source code to CFG.
- CFG is printed in sorted text form according to each block's level.
 - Each block has block's name and major contents to be shown.
 - Each edge has a data of block to be connected.
 - Related block and edge are printed in the same line.
- Restriction of Input C source code
 - The C source code has 100~200 lines which includes main function.
 - It doesn't include pointers.
 - It is a single-file that doesn't have user defined header files.
 - Body of user defined functions should be ahead of main function.
 - Conditional statements should be wrapped in a brace({ }) at the next line of corresponding keyword.

Statement of Purpose [2/2]

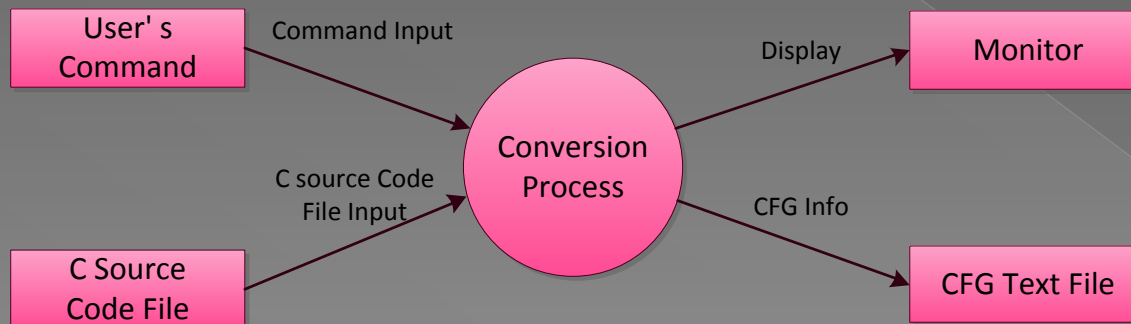
- ◉ When a user inputted incorrect command, the program show “help” that includes command syntax.
- ◉ When C source code inputted successfully, the program shows “success” message. Or in error case, the program shows “error” and terminates the program.  supplement
- ◉ Before the program converting CFG, shows “converting” message.
- ◉ After report generating process, the program shows the name of report file.
- ◉ Edges Recognition Algorithm, Basic Block Construction Algorithm, BFS Positioning Algorithm are used.

System Context Diagram



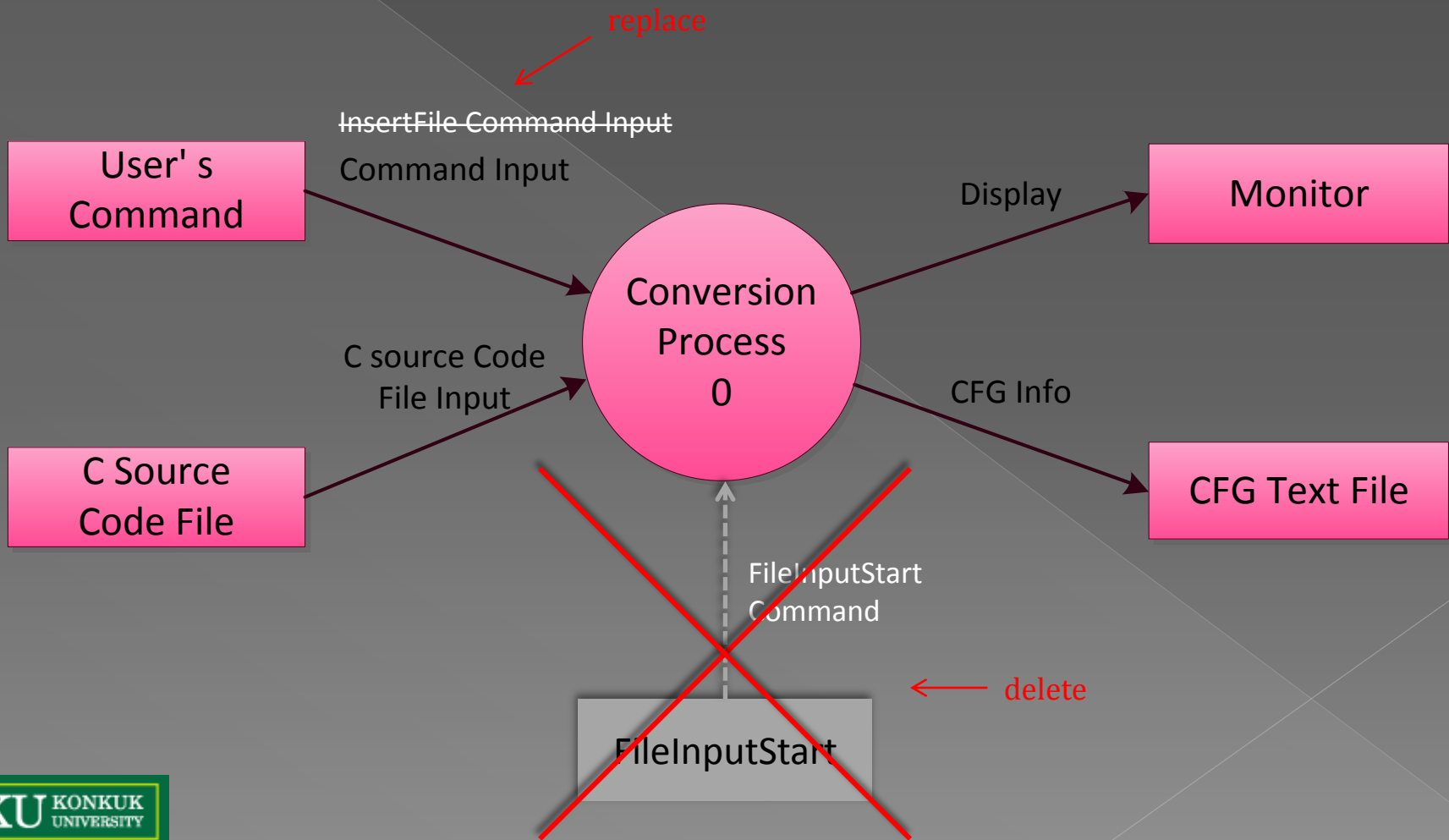
Event List

Input / Output Event	Description
Command Input	Receives a command from User's Command
C Source Code File Input	Receives a C source code file
Display	Prints Commands' result and CFG's process to Monitor
CFG Info	Prints converted CFG to CFG Text File

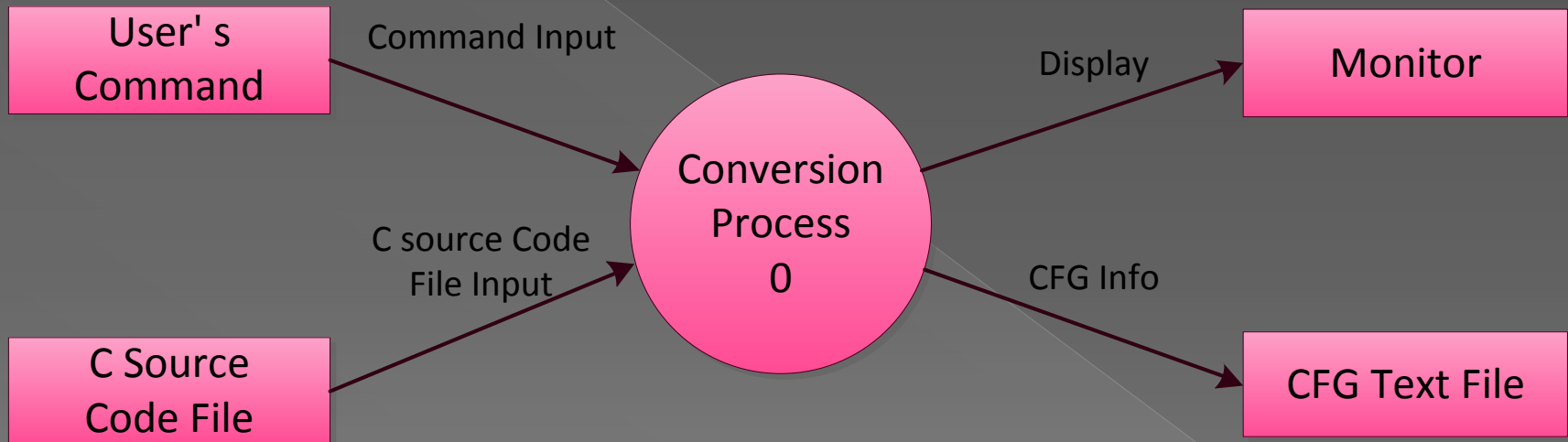


Behavioral Model

Data Flow Diagram – level 0



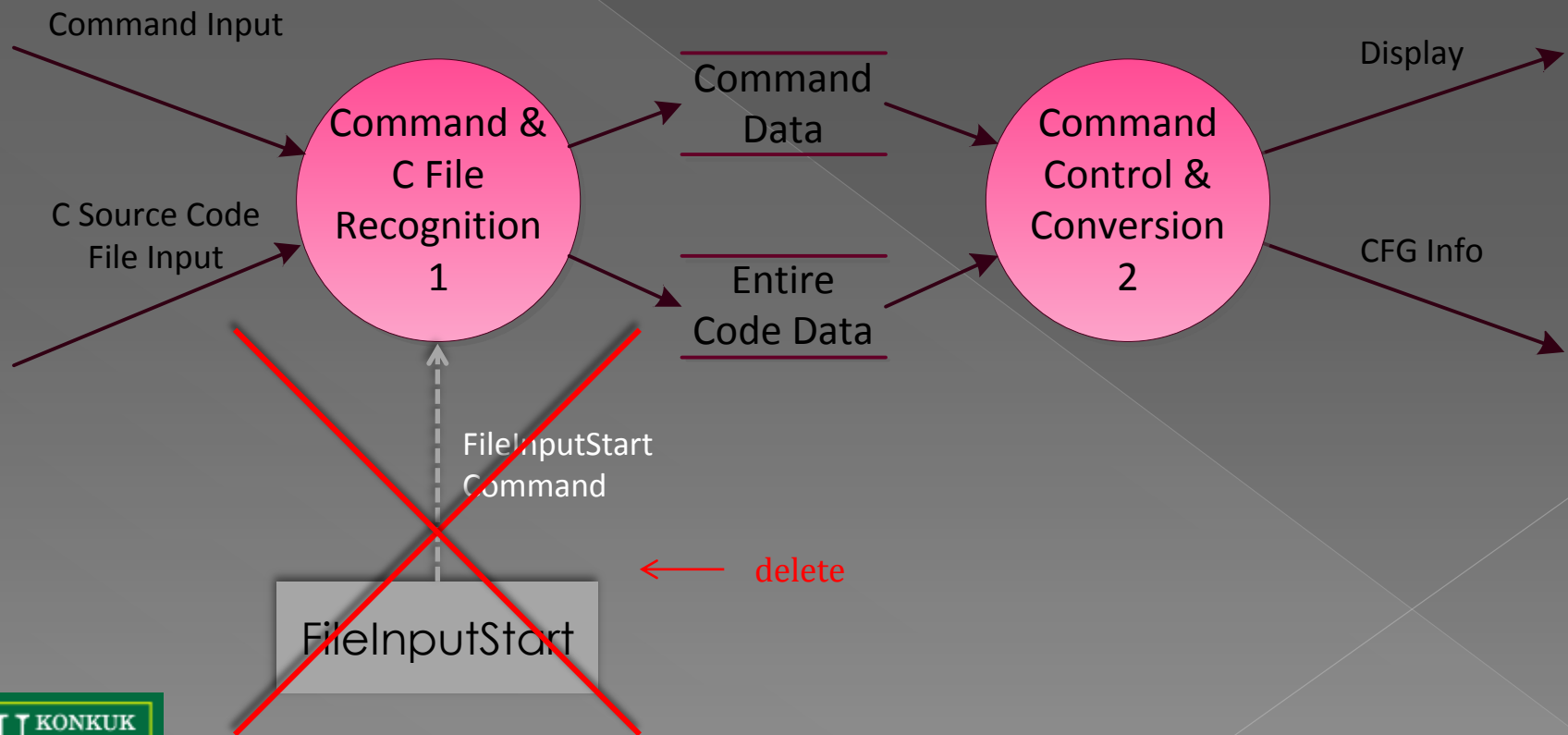
Data Flow Diagram – level 0



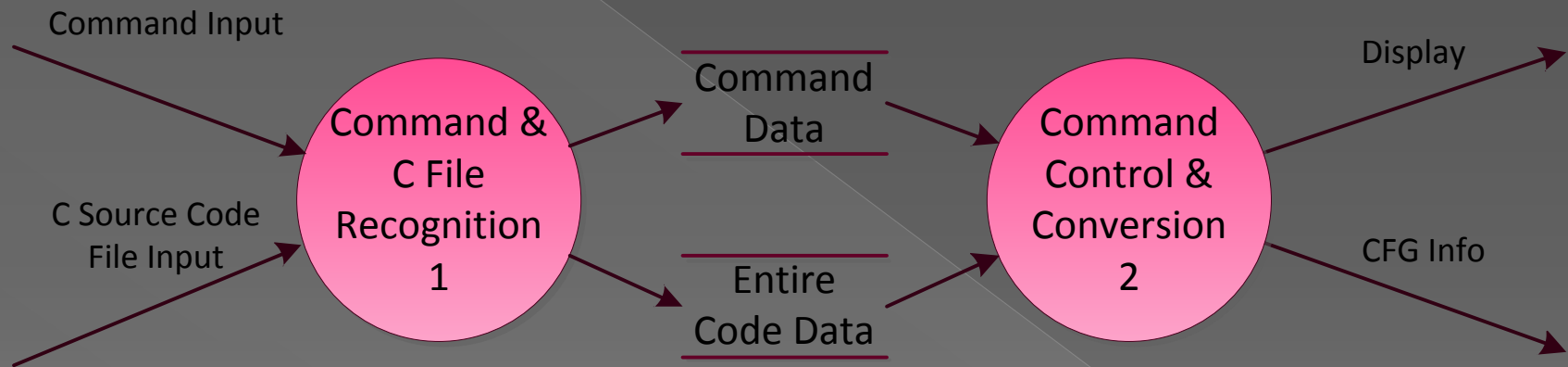
Data Dictionary – level 0

Data name	Description
Command Input	It is received command from User's Command .
C Source Code File Input	It is inputted C source code file.
CFG Info	It is CFG data converted from inputted C source code.
Display	It is an output data contains system message caused by Command Info and CFG's process result to be sent to Monitor .

Data Flow Diagram – level 1



Data Flow Diagram – level 1



Data Dictionary – level 1

Command Data	Description
Correctness Info	A boolean value meaning correctness of received command. (True/False)

↖
revise : exclude filename (string)

Entire Code Data	Description
Numbered Code Data	It consists of C Source Code File Input and each corresponding line number.

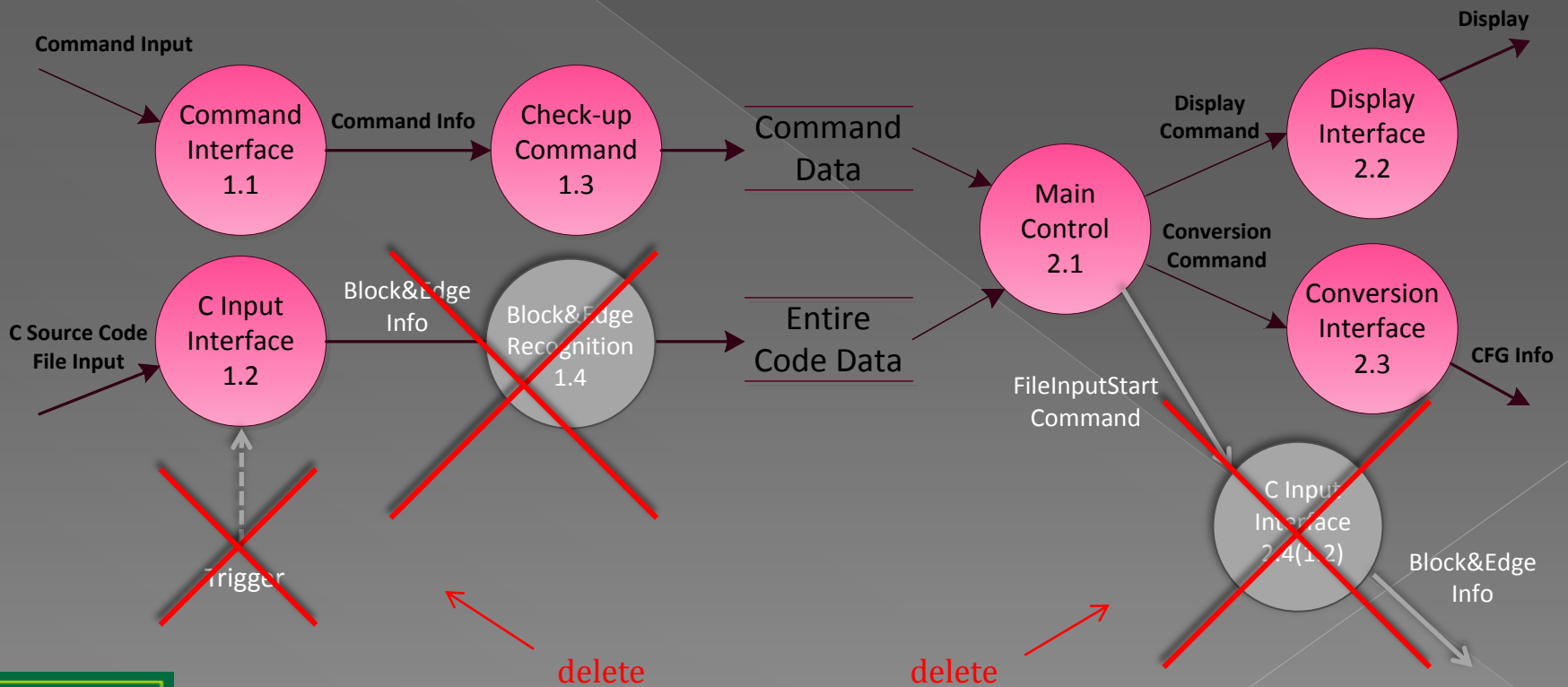
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revise : from Block&Edge Data

Data Dictionary – level 1

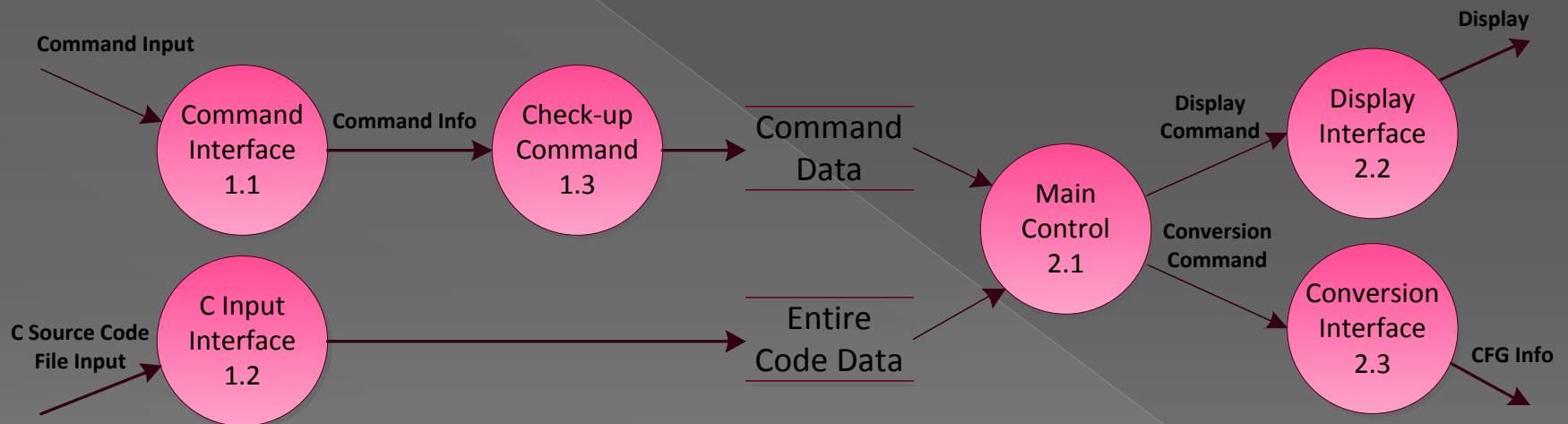
Command Data	Description
Correctness Info	A boolean value meaning correctness of received command. (True/False)

Entire Code Data	Description
Numbered Code Data	It consists of C Source Code File Input and each corresponding line number.

Data Flow Diagram – level 2



Data Flow Diagram – level 2



Data Dictionary – level 2

Data name	Description
Command Info	It is a processed Command Input for Check-up Command to check correctness of received command.
Display Command	A data that shows system message or program's progress to be sent to Display Interface .
Conversion Command	A CFG conversion data converted from Parsed Data to be sent to Conversion Interface .

Process Specification [1/3]

Reference No.	1.1
Name	Command Interface
Input	Command Input
Output	Command Info
Description	Receiving a Command Input of the User's Command , converts it to Command Info that the system can make use of.

Reference No.	1.2
Name	C Input Interface
Input	C Source Code File Input
Output	Numbered Code Data
Description	Receiving a C Source Code File Input , numbers off in order and save it to Entire Code Data .

Process Specification [2/3]

Reference No.	1.3
Name	Check-up Command
Input	Command Info
Output	Correctness Info
Description	Checking correctness of Command Info , assigns an boolean value and sends Correctness Info to Command Data .

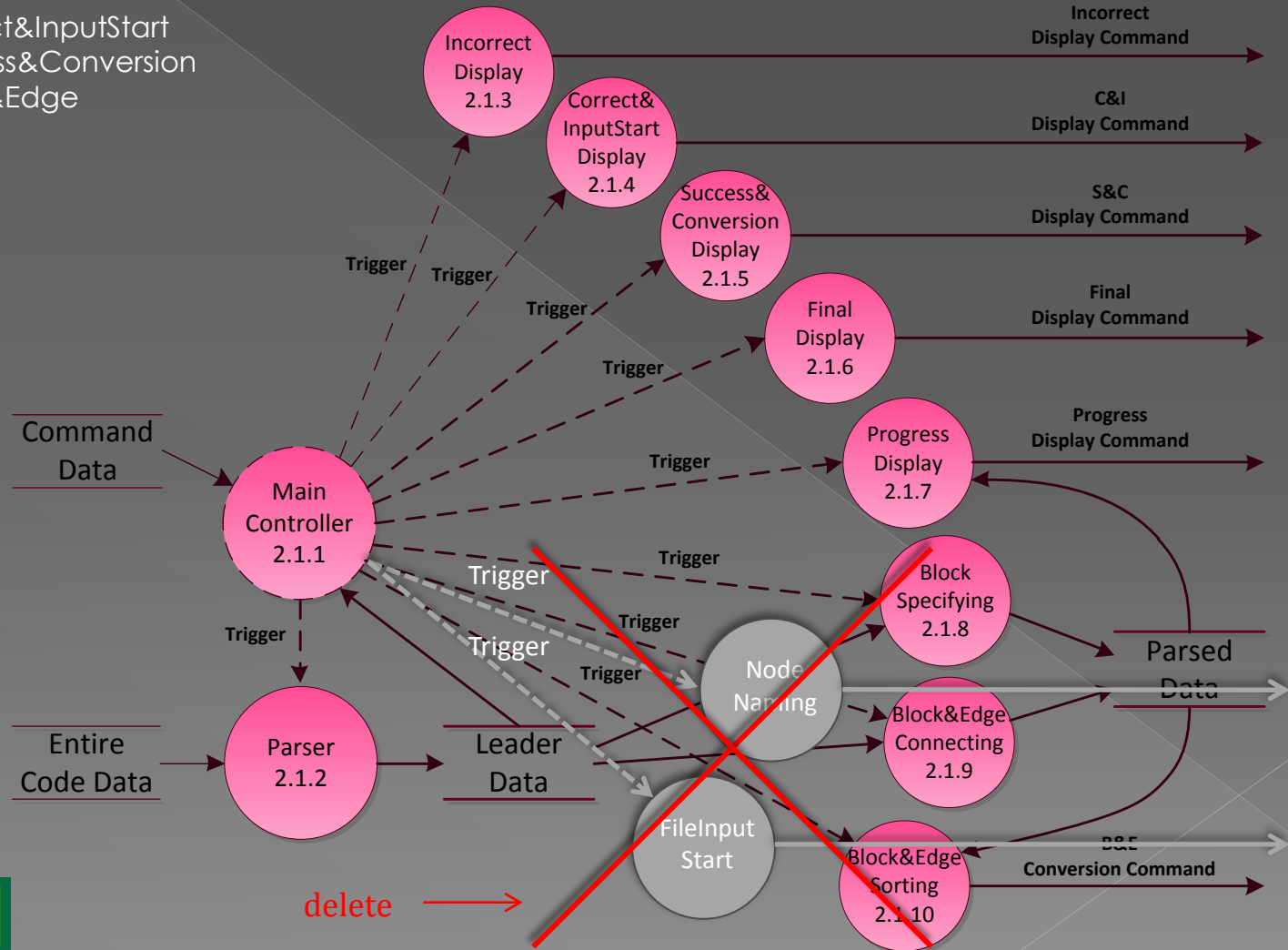
Reference No.	2.2
Name	Display Interface
Input	Display Commands
Output	Display
Description	Receiving all sorts of Display Commands from sub processes, sends a Display converted from them to Monitor to be printed.

Process Specification [3/3]

Reference No.	2.3
Name	Conversion Interface
Input	Conversion Command
Output	CFG Info
Description	Receiving Conversion Command , converts it to final output CFG Info . It enables CFG Generator to report with a text file by sending CFG Info to CFG Text File .

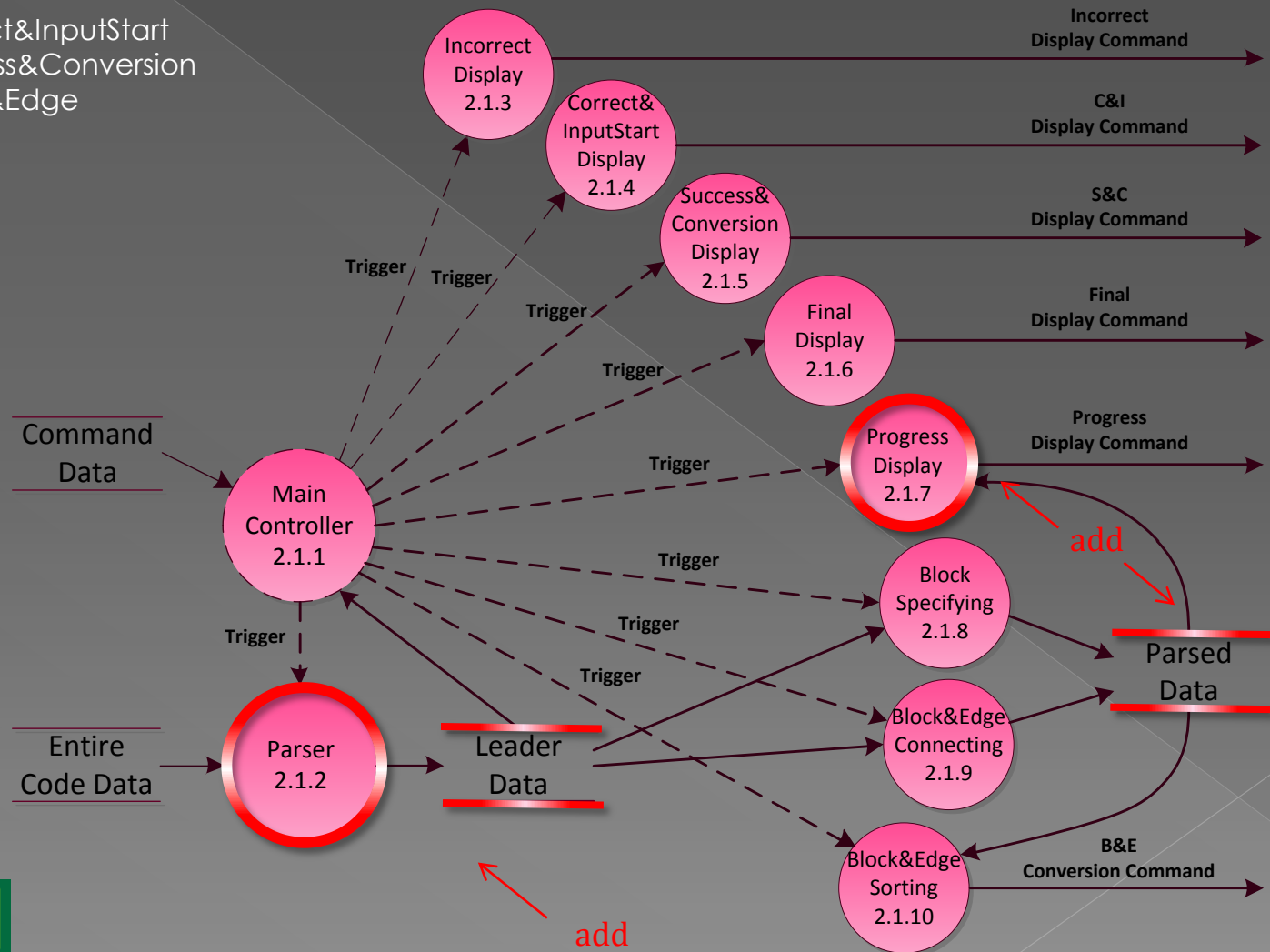
Data Flow Diagram – level 3

C&I : Correct&InputStart
 S&C : Success&Conversion
 B&E : Block&Edge



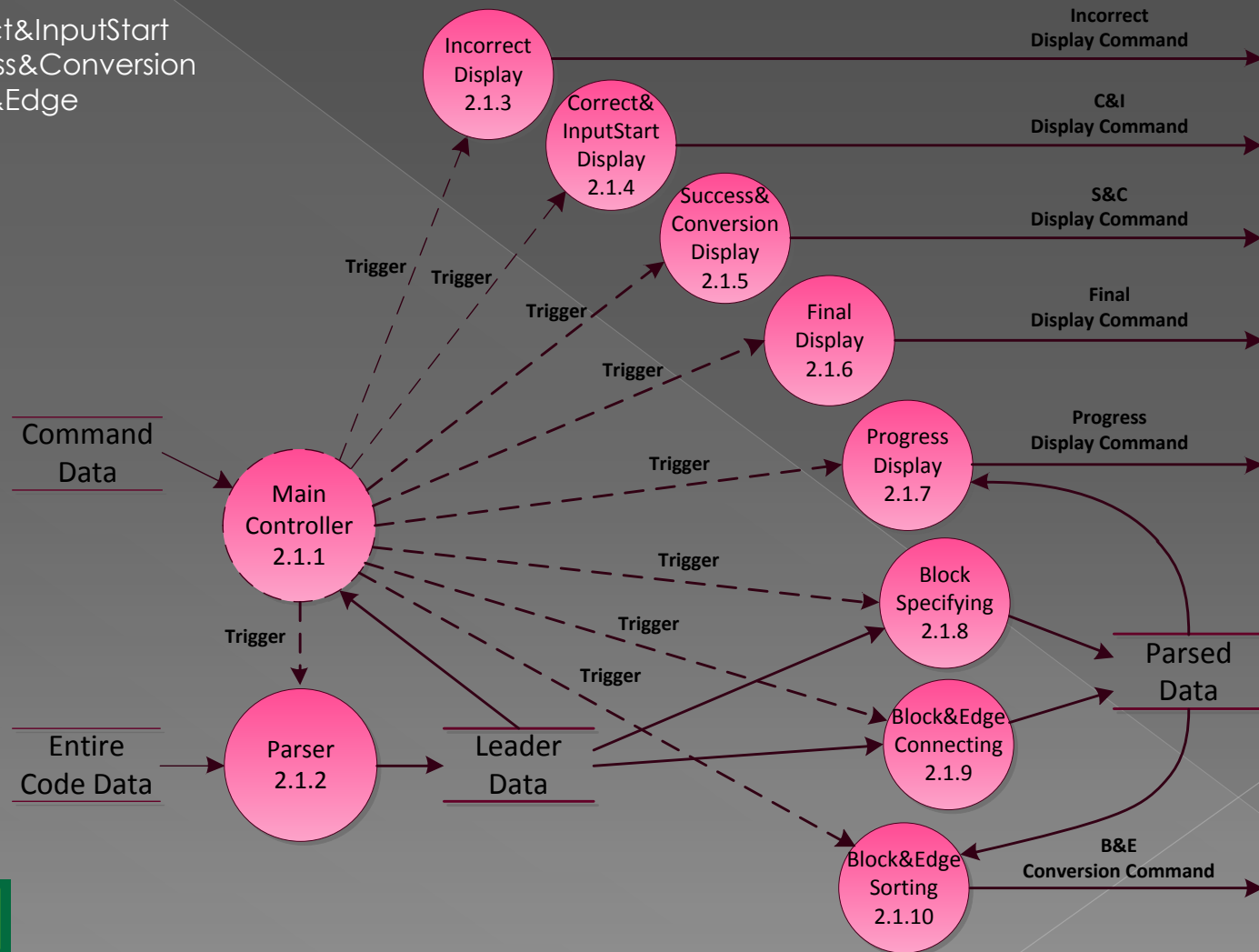
Data Flow Diagram – level 3

C&I : Correct&InputStart
 S&C : Success&Conversion
 B&E : Block&Edge



Data Flow Diagram – level 3

C&I : Correct&InputStart
 S&C : Success&Conversion
 B&E : Block&Edge



Data Dictionary – level 3 [1/2]

Leader Data	Description
Raw Block Data	A raw data of code which can be a block (C keyword, assignment statement...).
Raw Edge Group Data	A group data of all raw edge data being decided and conditioned when Raw Block Data is formed.

Parsed Data	Description
Block Data	It consists of block's name, ID number, range of source code, and major contents.
Edge Group Data	A group data of all parsed edges. Each edge data consists of edge's ID number, condition of control flow, source block's ID number, and destination block's ID number.

Data Dictionary – level 3 [2/2]

Data name	Description
Incorrect Display Command	A command data that contains error message meaning input of incorrect command and help message.
C&I Display Command	A command data that contains correct message meaning input of correct command and input start message meaning system will start to input of C source code file at once.
S&C Display Command	A command data that contains success message meaning system received input file successfully and conversion message meaning system will start to convert file to CFG at once.
Final Display Command	A command data that contains completion message meaning end of CFG converting and the name of report file.
Progress Display Command	A command data that contains execution order of C source code and progress.
B&E Conversion Command	A command data being sent to Conversion Interface to convert Parsed Data to final CFG.

Process Specification [1/5]

Reference No.	2.1.1
Name	Main Controller
Input	Leader Data, Correctness Info
Output	Trigger
Description	It triggers Parser and other processes which output Display Command or Conversion Command based on inputs (Leader Data, Correctness Info).

Reference No.	2.1.2
Name	Parser
Input	Numbered Code Data, Trigger
Output	Leader Data
Description	Converting Numbered Code Data into Raw Block Data and Raw Edge Group Data , stores them in the Leader Data .

Process Specification [2/5]

C&I : Correct&InputStart

Reference No.	2.1.3
Name	Incorrect Display
Input	Trigger
Output	Incorrect Display Command
Description	When a user input incorrect command, sends Incorrect Display Command which consists of error message and help message to Display Interface . Afterward, terminates program.

Reference No.	2.1.4
Name	Correct&InputStart Display
Input	Trigger
Output	C&I Display Command
Description	When a user input correct command, sends C&I Display Command which consists of correct message and input start message to Display Interface .

Process Specification [3/5]

S&C : Success&Conversion

Reference No.	2.1.5
Name	Success&Conversion Display
Input	Trigger
Output	S&C Display Command
Description	When system receives input file successfully and Numbered Code Data is created, it sends S&C Display Command which consists of success message and conversion message to Display Interface .

Reference No.	2.1.6
Name	Final Display
Input	Trigger
Output	Final Display Command
Description	After finishing parsing and sorting, sends Final Display Command which consists of completion message and the name of report file to Display Interface . Afterward, terminates program.

Process Specification [4/5]

Reference No.	2.1.7
Name	Progress Display
Input	Parsed Data, Trigger
Output	Progress Display Command
Description	Receiving Parsed Data , it sends Progress Display Command which shows execution order of C source code and progress to Display Interface .

Reference No.	2.1.8
Name	Block Specifying
Input	Leader Data, Trigger
Output	Block Data
Description	Receiving incomplete Leader Data , outputs Block Data specifying each block's concrete information.

Process Specification [5/5]

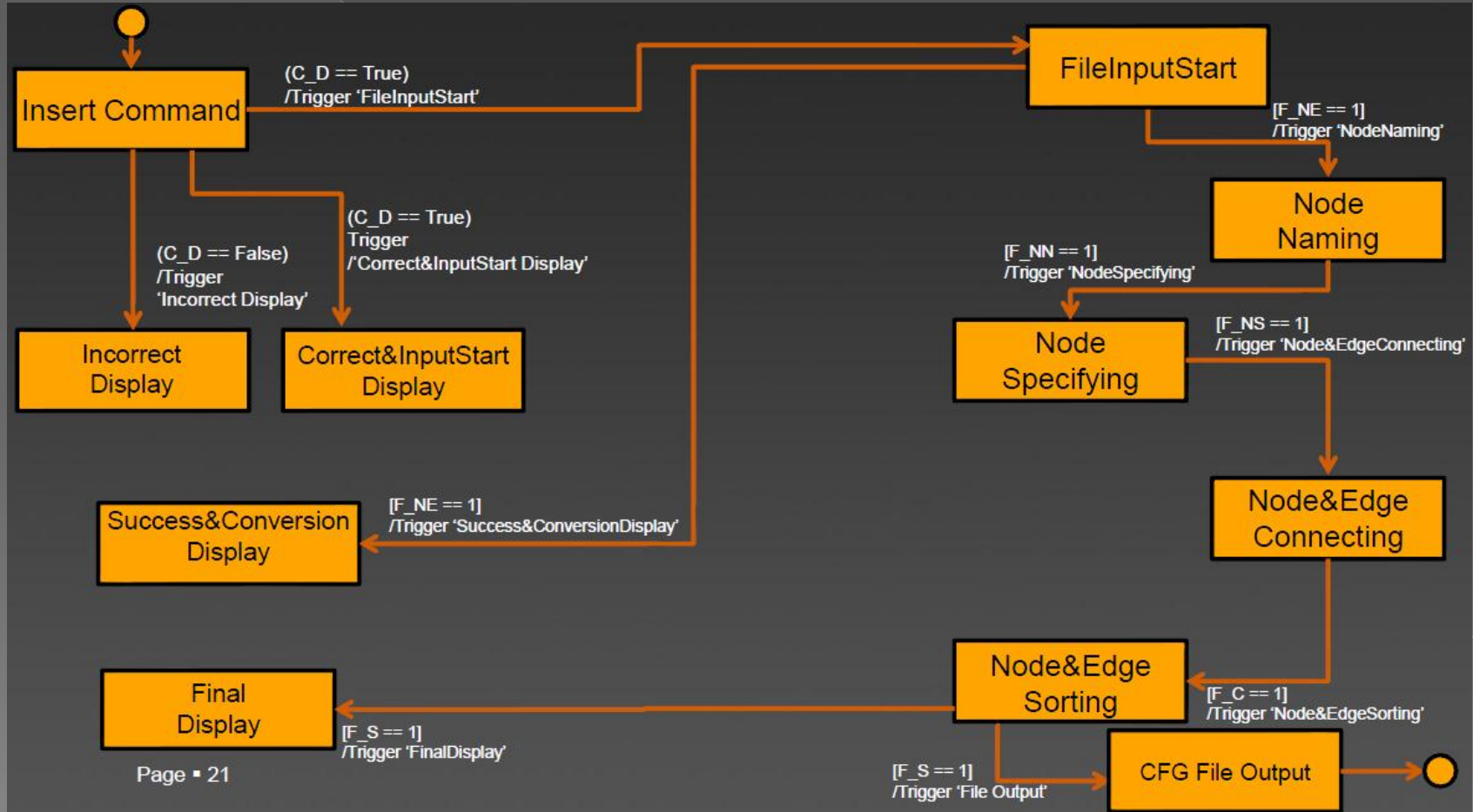
B&E : Block&Edge

Reference No.	2.1.9
Name	Block&Edge Connection
Input	Leader Data, Trigger
Output	Edge Group Data
Description	Receiving incomplete Leader Data , outputs Edge Group Data whose each edge data corresponds with involved blocks.

Reference No.	2.1.10
Name	Block&Edge Sorting
Input	Parsed Data, Trigger
Output	B&E Conversion Command
Description	Receiving Parsed Data , outputs B&E Conversion Command to be converted into final CFG in sorted text form according to each block's level.

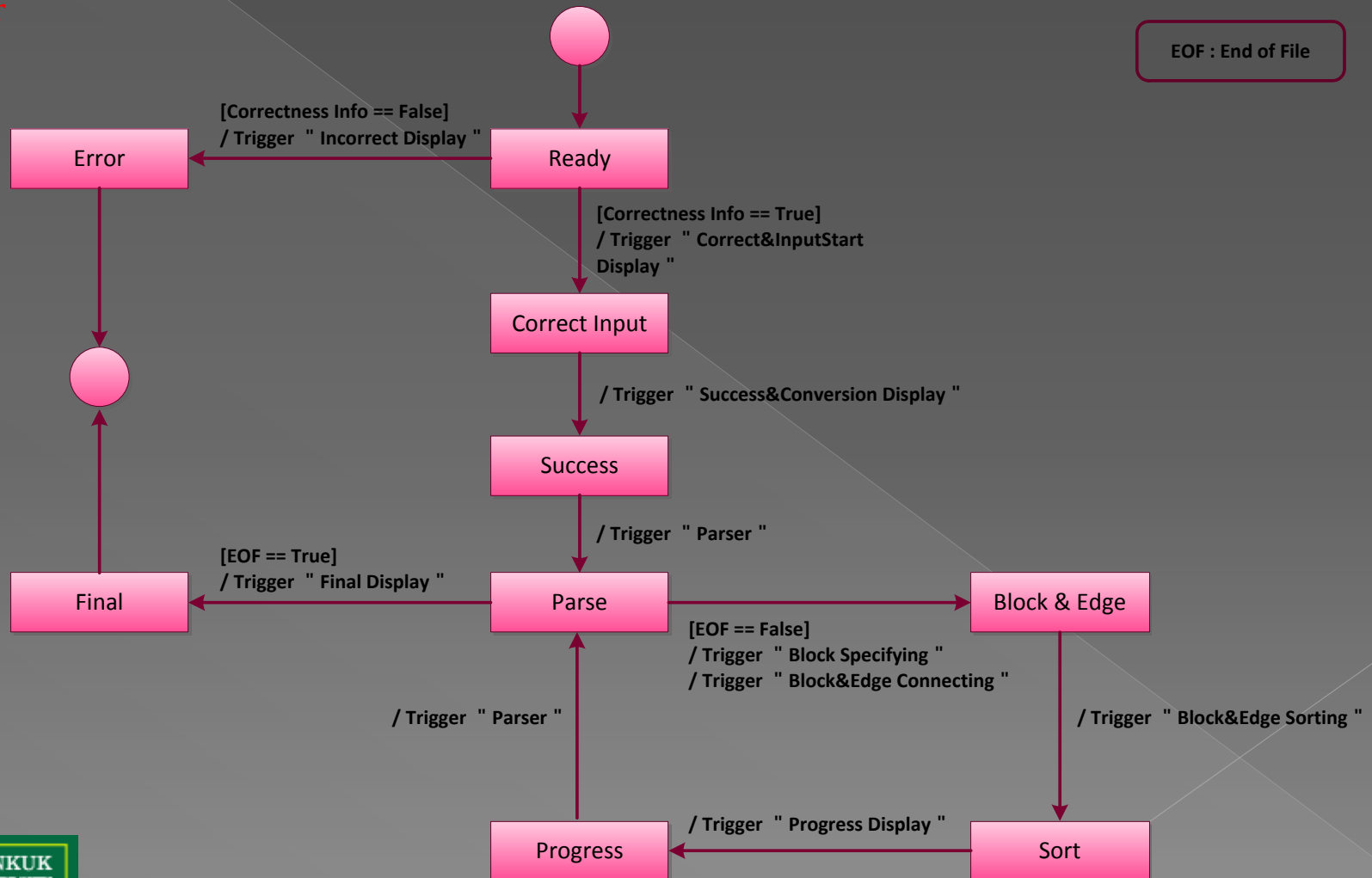
State Machine for Main Controller 2.1.1

before



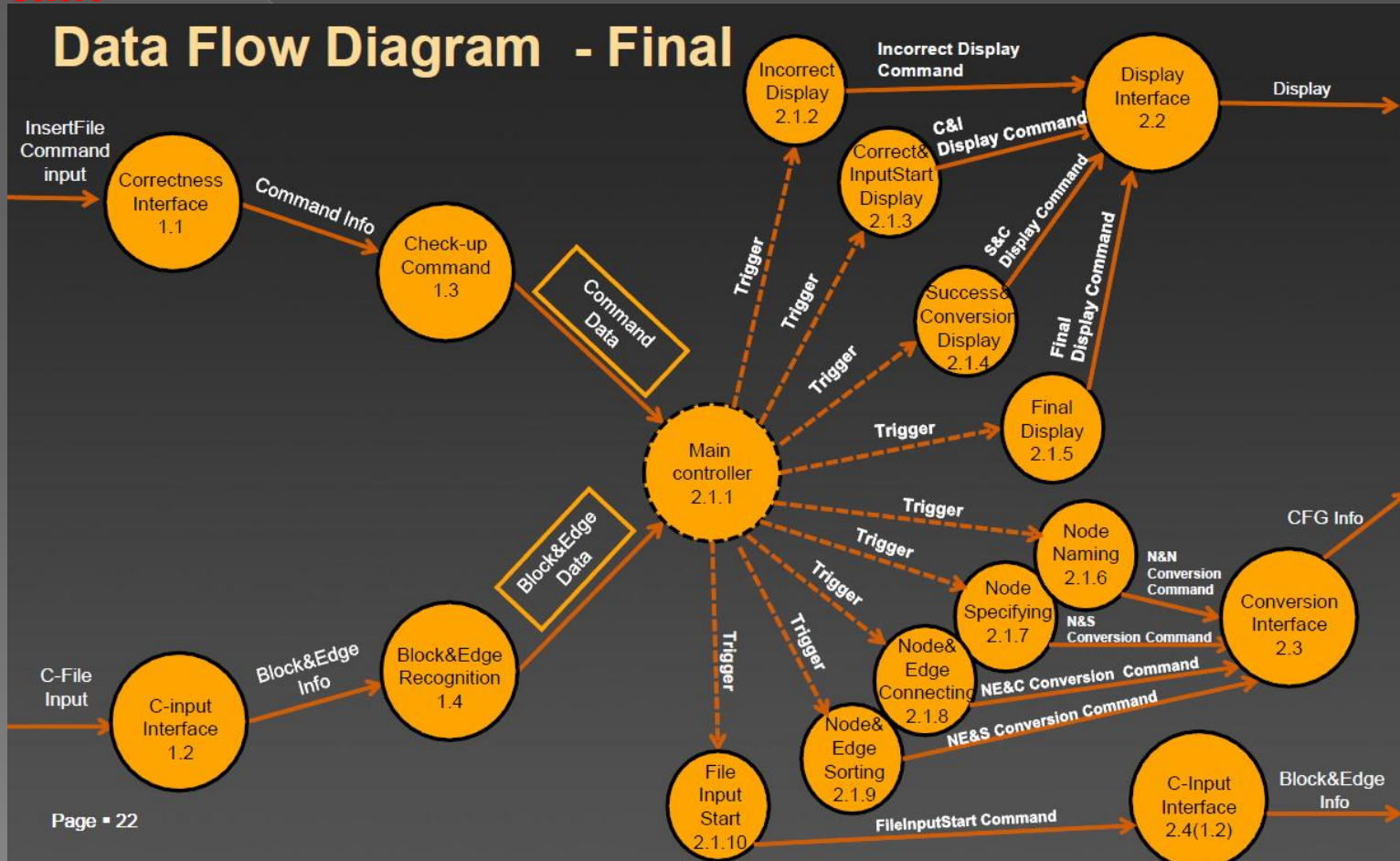
State Machine for Main Controller 2.1.1

after



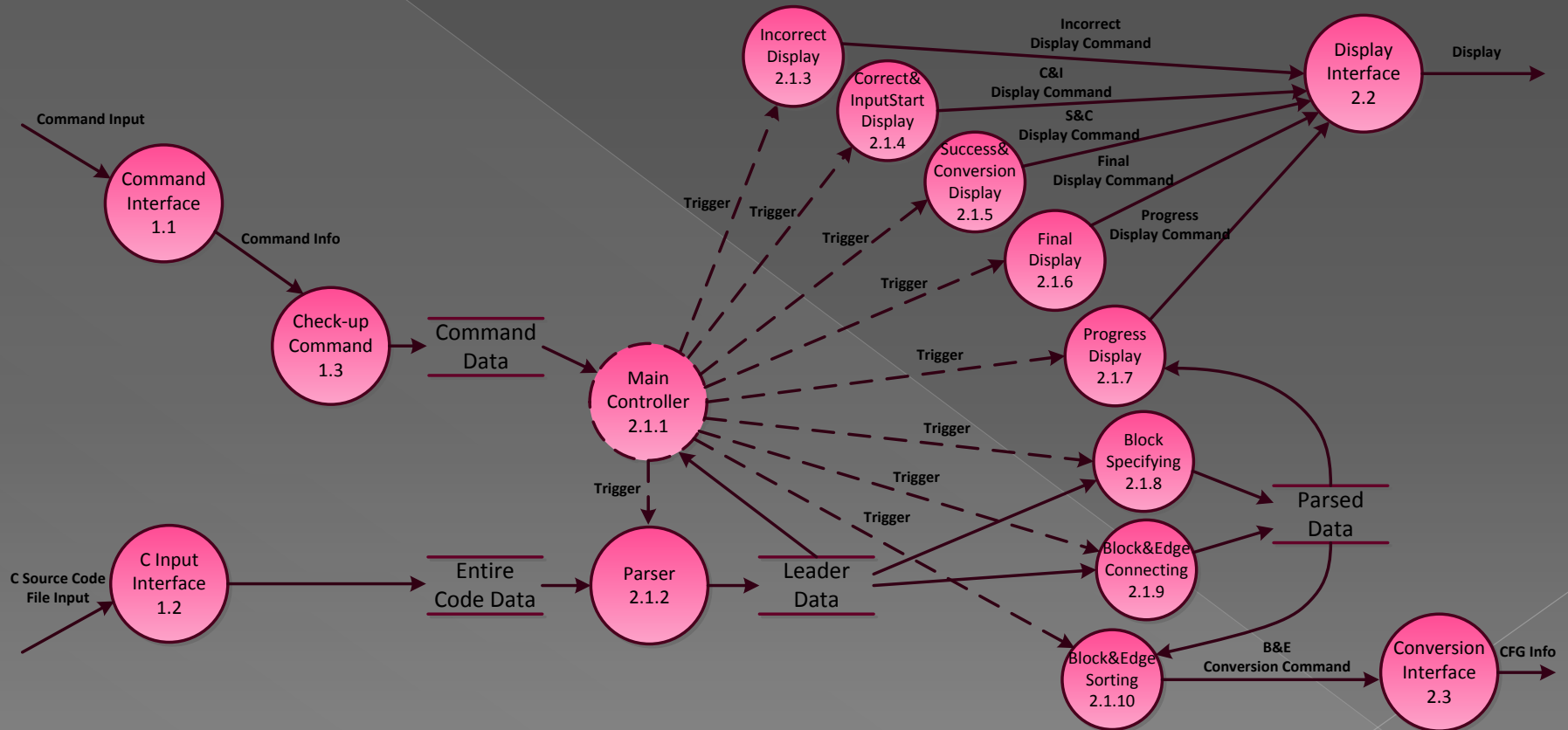
Data Flow Diagram - Overall

before



Data Flow Diagram - Overall

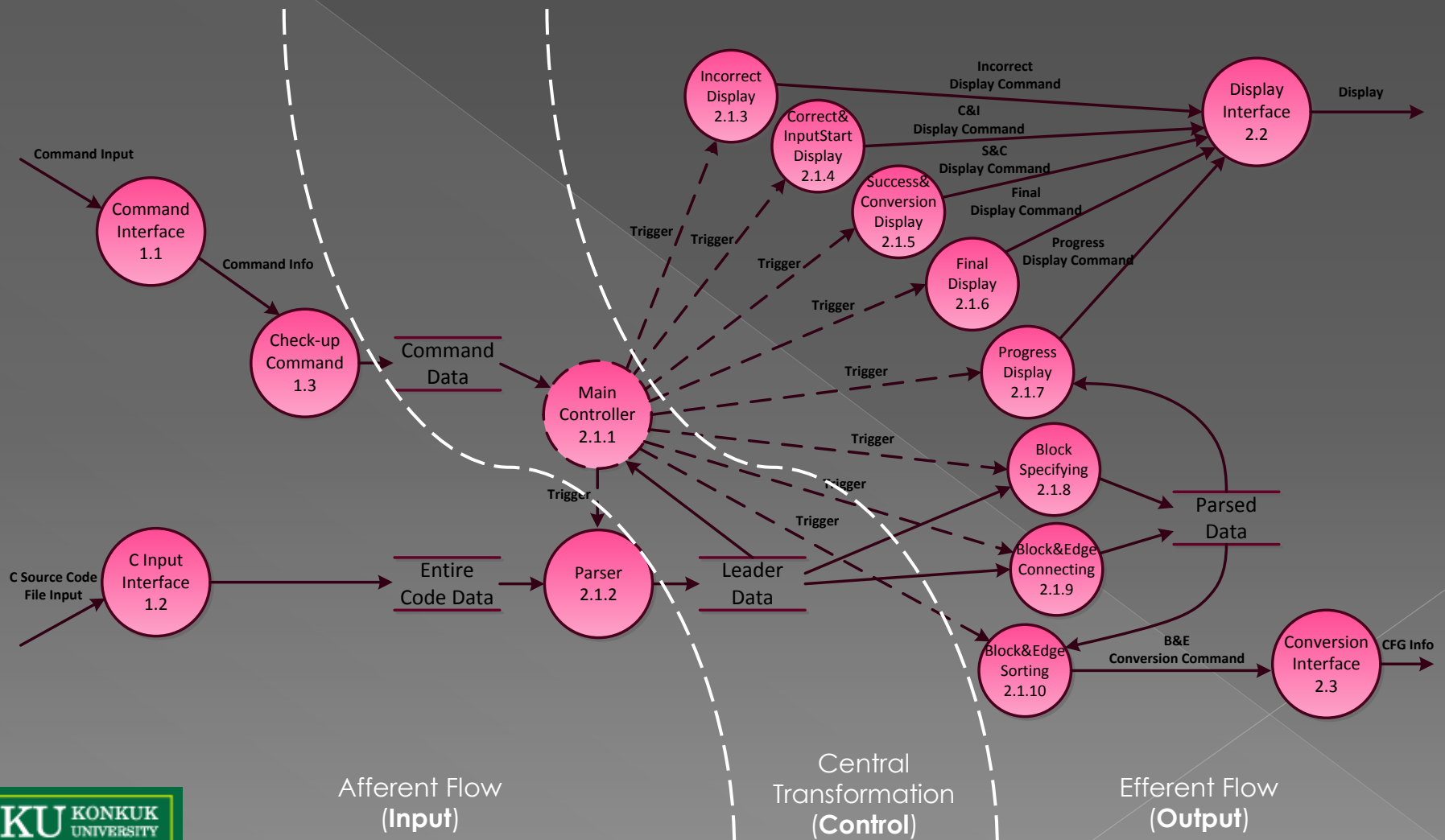
after



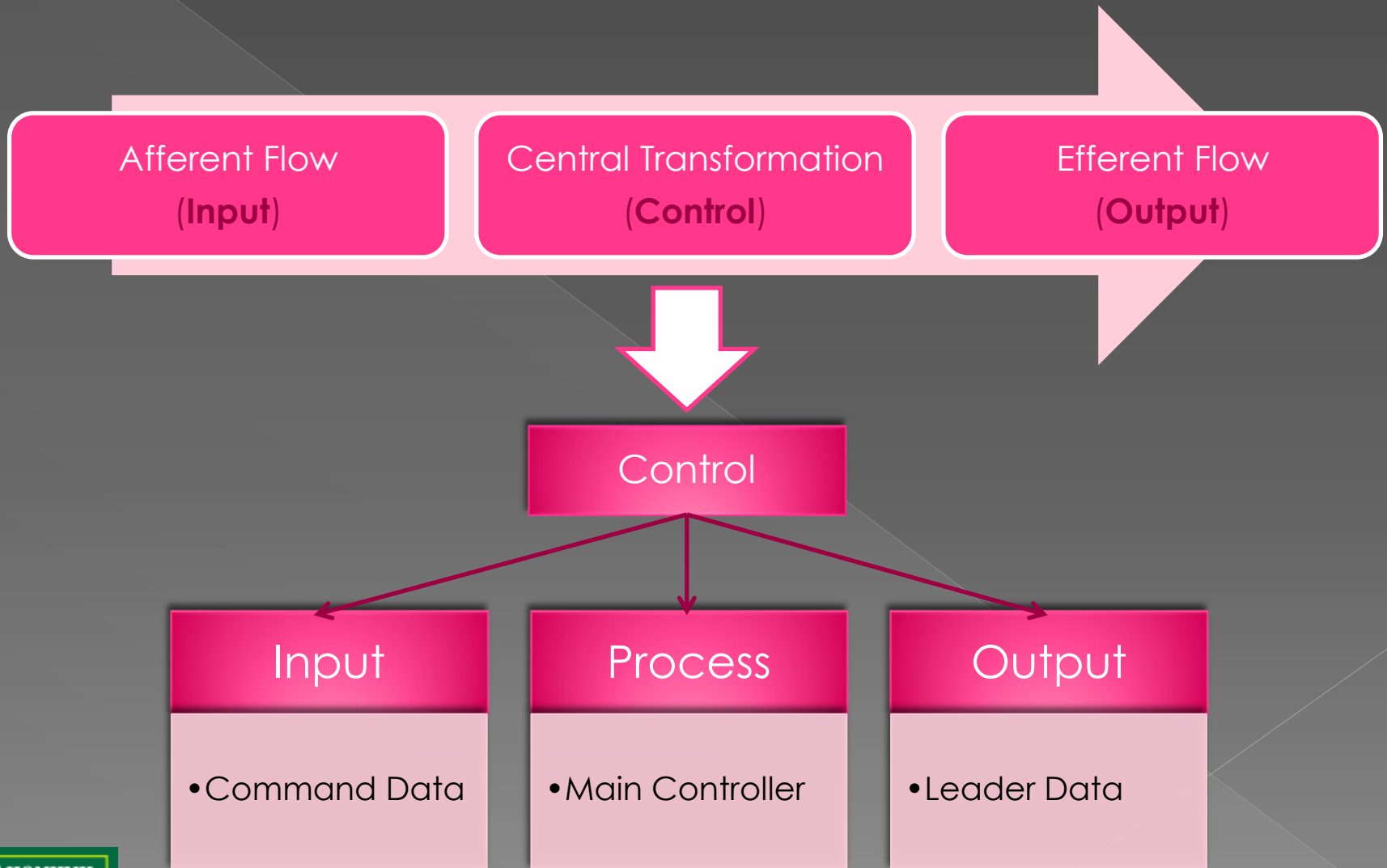
C&I : Correct&InputStart
 S&C : Success&Conversion
 B&E : Block&Edge

Implementation Model

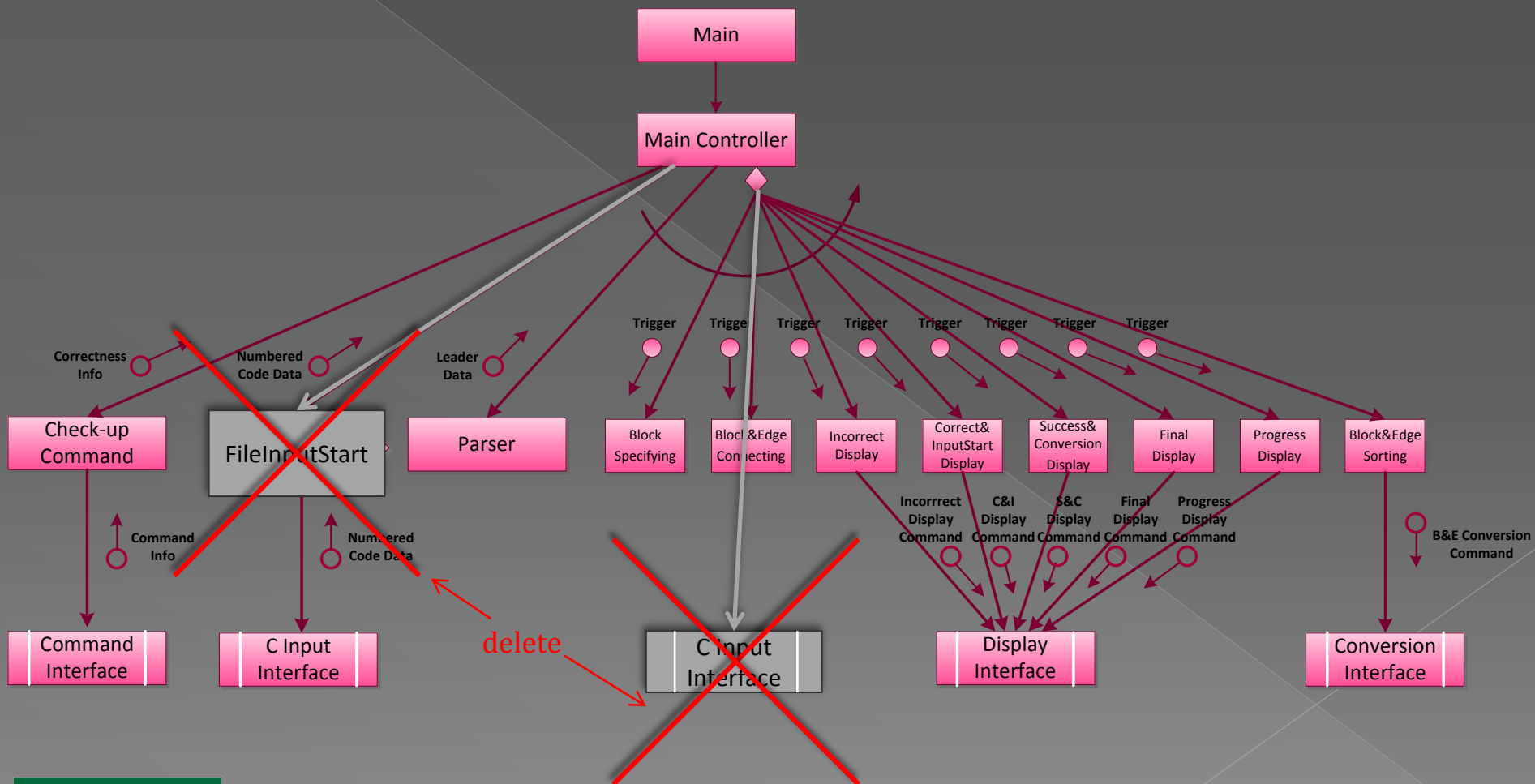
Structured Chart – Transform Analysis [1/2]



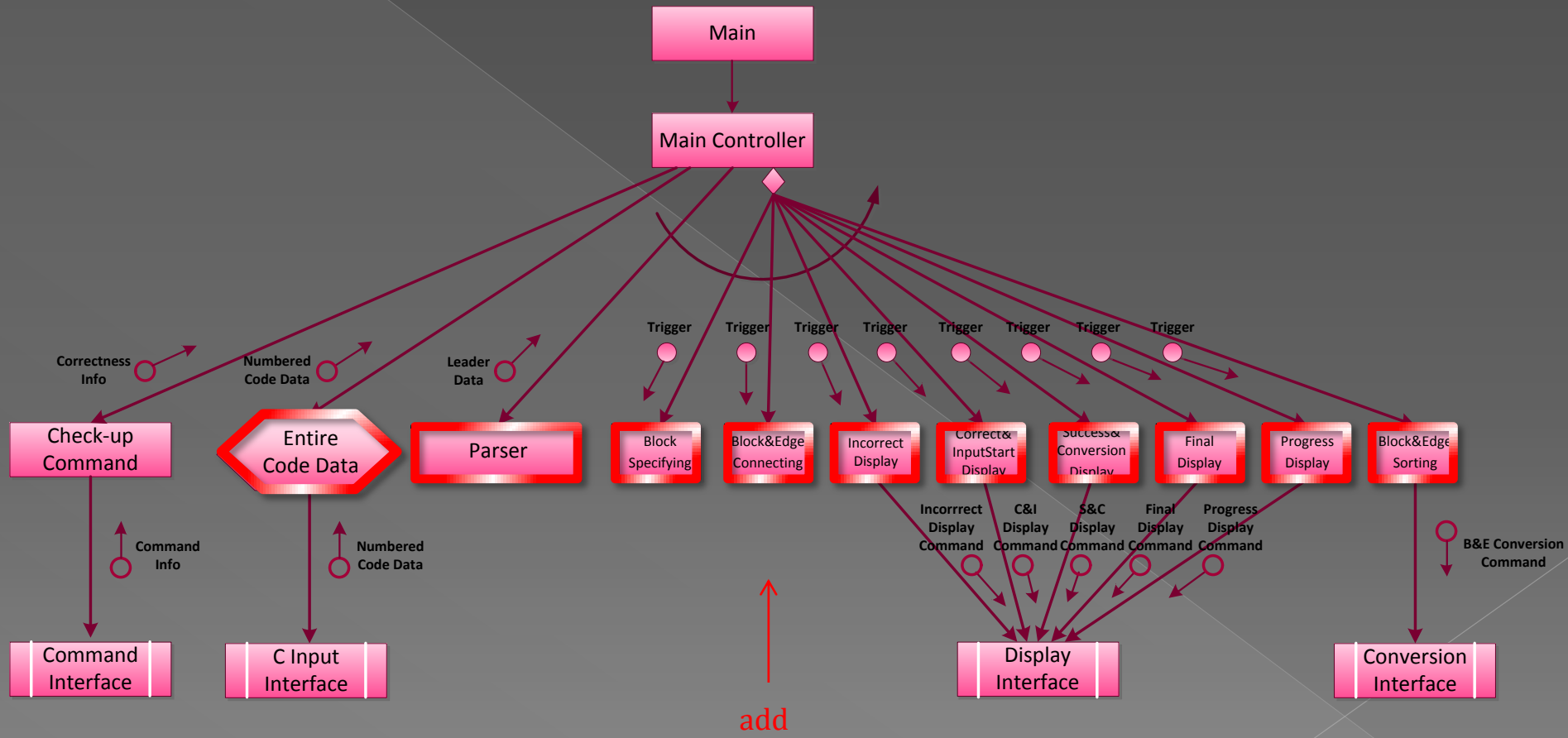
Structured Chart – Transform Analysis [2/2]



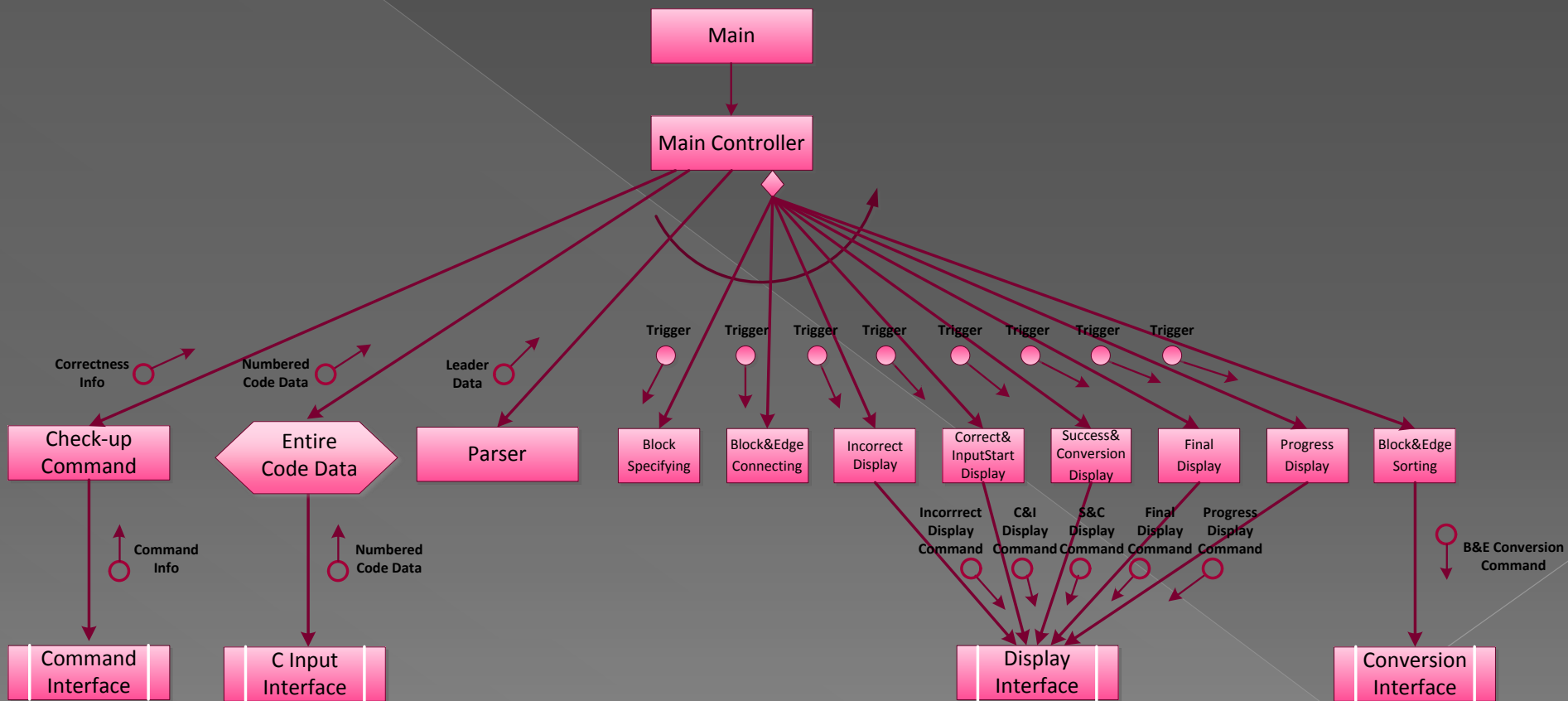
Structured Chart – CFG Generator



Structured Chart – CFG Generator



Structured Chart – CFG Generator



Structured Chart – Data Definition [1/2]

Data name	Description
Command Info	It is a processed Command Input for Check-up Command to check correctness of received command.
Correctness Info	A boolean value meaning correctness of received command. (True/False)
Numbered Code Data	It consists of C Source Code File Input and each corresponding line number.
Leader Data	It is a structure data { Raw Block Data, Raw Edge Group Data }
Incorrect Display Command	A command data that contains error message meaning input of incorrect command and help message.

Structured Chart – Data Definition [2/2]

Data name	Description
C&I Display Command	A command data that contains correct message meaning input of correct command and input start message meaning system will start to input of C source code file at once.
S&C Display Command	A command data that contains success message meaning system received input file successfully and conversion message meaning system will start to convert file to CFG at once.
Final Display Command	A command data that contains completion message meaning end of CFG converting and the name of report file.
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Question?