GrAlgo

Group 5

Sahil Chandra- CS20BTECH11033
P. Ganesh Nikhil Madhav- CS20BTECH11036
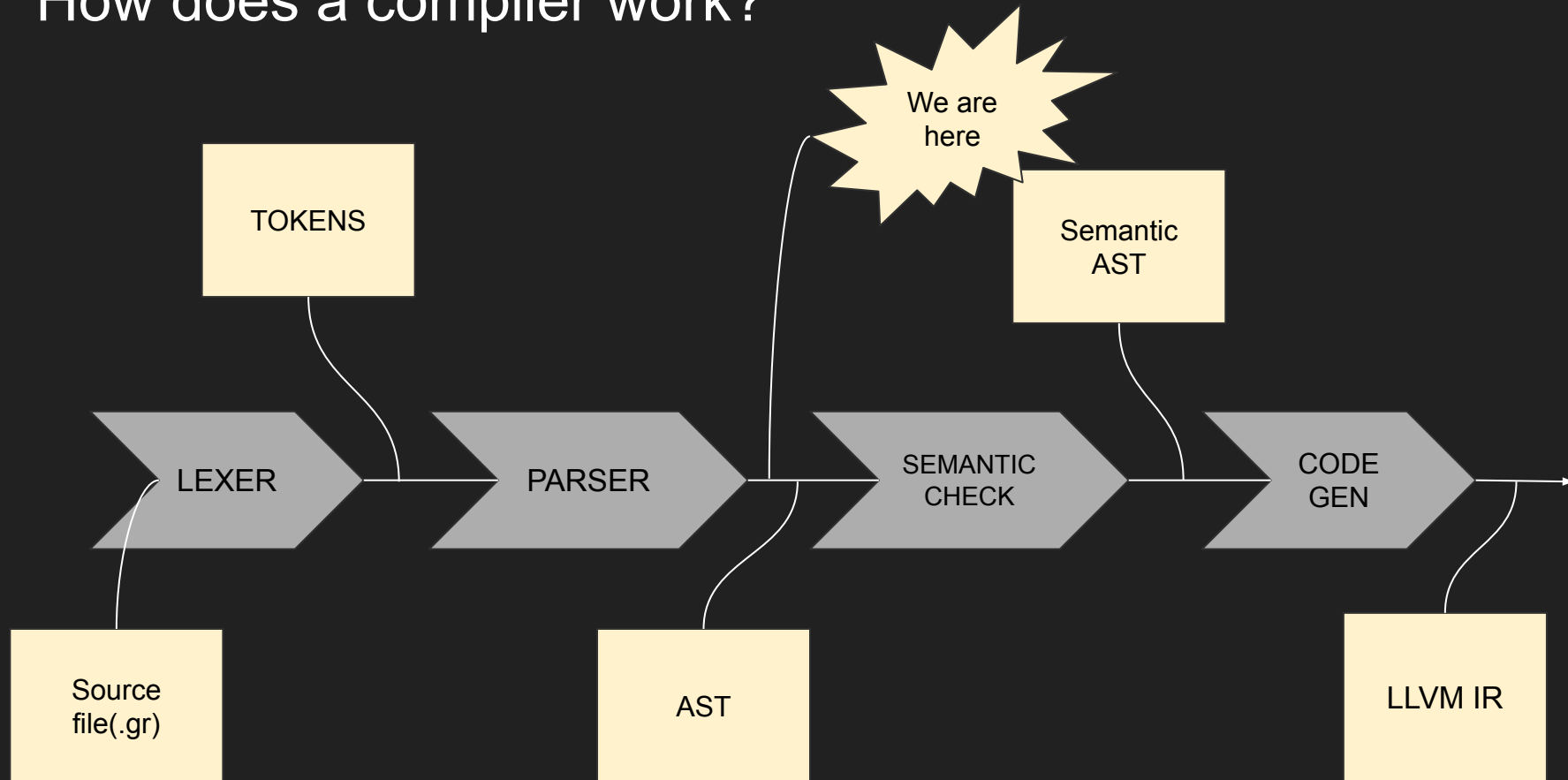Gorantla Pranav Sai- CS20BTECH11018
Suraj Telugu- CS20BTECH11050
Umesh Kalvakuntla- CS20BTECH11024
Vanga Aravind Shounik- CS20BTECH11055
Adepu Vasisht- CS20BTECH11002

How does a compiler work?

Parsing

- Parsing is done to verify whether our language is following the grammar rules or not.
- It generates an Abstract Syntax Tree(AST) which is representation that conveys the structure of our source code.
- Each Node in the AST represents a construct occurring in the source code.
- Parse tree can be built using several techniques like top-down or bottom-up etc.
- We use BISON to generate a parser for our language.

PARSER

- We use BISON which is a general purpose parser generator that takes in a CFG and generates a LR Parser employing LALR(1) parser tables.
- BISON takes in our grammar in a special file with a .y which contains rules for the grammar and generates two files "parser.tab.c" and "parser.tab.h".
- Now we include "parser.tab.h" in the lexer file and run flex on our lexer file to get lex.yy.c file.
- After getting that lex.yy.c file we compile that , parser.tab.c and parser-funcs.c using gcc and input the source code to get the respective AST.

PARSER

- As mentioned to generate our parser we use BISON and also use FLEX for compiling the .l file.(See chart below for better understanding)
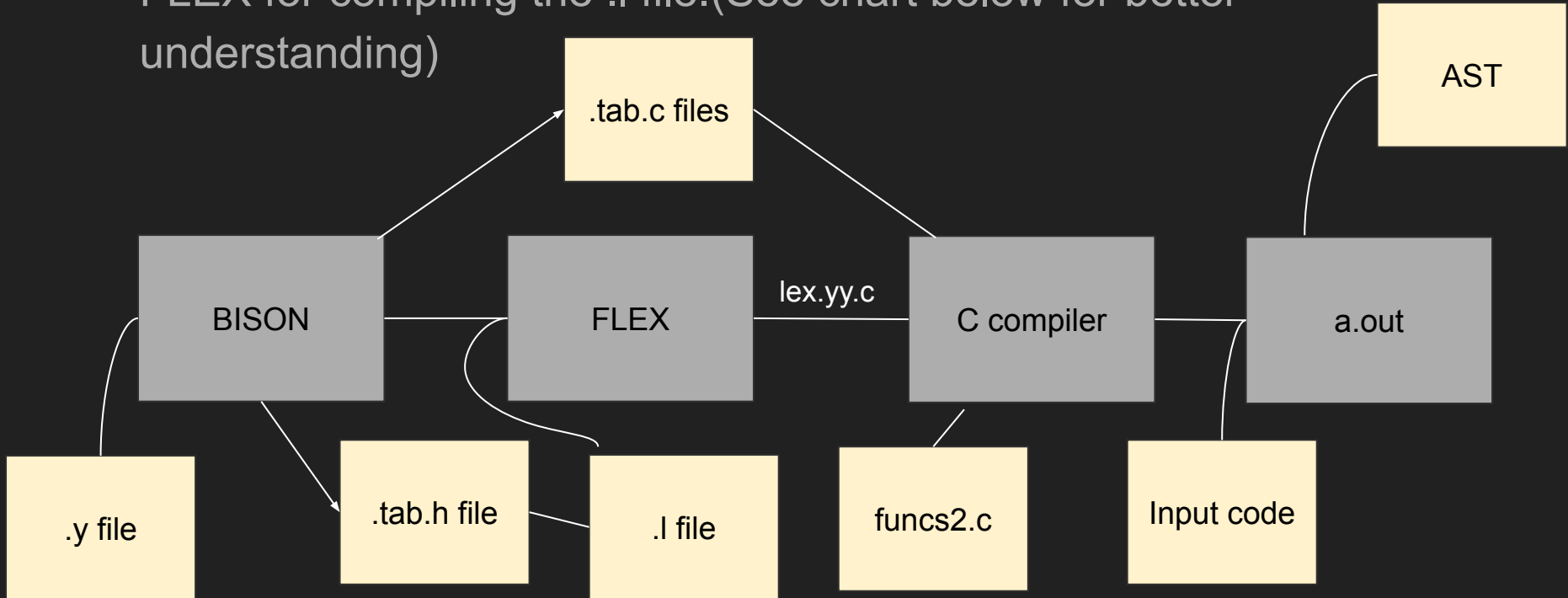
Using our Parser

- The folder "Parser" contains the following files.
  - parser.y
  - lexer.l
  - funcs.c
  - makefile
  - input<number>.gr in inputs folder (Testcases)
- "make" command is used to run these files and generate the output where in this case we obtain the Abstract Syntax Tree of the program.
- For the detailed explanation for the commands inside the makefile go through the following slides.

Lessons Learnt from this part of Project

- We have learnt the Bison through Flex and Bison by O'Rielly. Bison was chosen as a parser generator as it provides a good interface for Grammar.
- We have understood how Bison works and explored different ways to generate Abstract Syntax Tree.
- Without using much predefined C Grammar we challenged ourselves to write Grammar from the start and tried various possibilities as part of our learning
- The book Flex and Bison by O'Rielly had an example on how to generate AST. We referred it for AST generation
- We have analysed the generated Parser with various test cases and tried avoiding all the possible shift - reduce and reduce - reduce conflicts