GHAH

Major Project Presentation

Java

Compiler Automation Tool

Pile of sheets now just a click away

Under the guidance of:

Ms. Rekha Bhatia

Department of Computer Science & Engineering
Guru Tegh Bahadur Institute of Technology
G-8 Area, Rajouri Garden, New Delhi - 110064

Year : 2013

Compiler Automation Tool

GHAH

Introduction

Compiler Automation Tool is a java based application, a tool for automating the task of compilation process. With CAT, a compiler designer can design compiler for any language using user-friendly graphical interface, by specifying regular expressions, transition diagram, context free grammar and various compiler specifications to generate a compiler model. This model is then used to compile a source code displaying intermediate processing results during each phase such as stream of tokens generated by lexical phase, parsing decisions etc. Such a tool will surely provide the designer a bright light over the language being designed and help to make strategy on how the compilation process must take place.

Compiler Automation Tool

GHAH

Special Features

- User friendly graphical Interface
- Graphical representation of automata
- Model wider set of programming languages
- No coding required – just think, model, generate
- Cross platform – model once compile anywhere
- Record compiler performance and obtain statistics

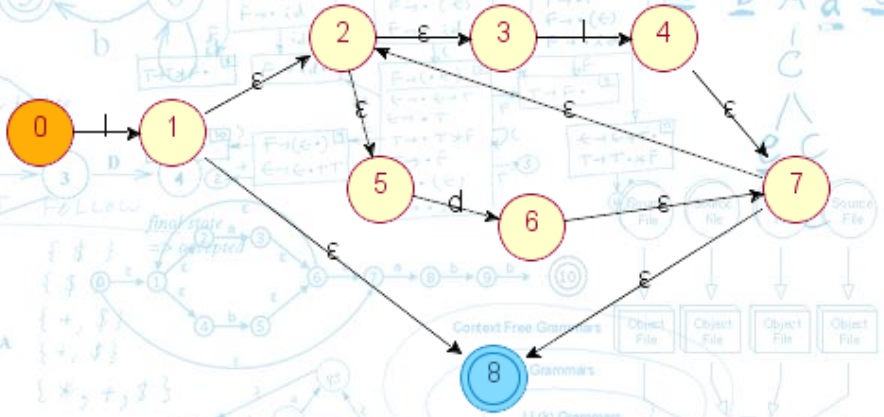
Compiler Automation Tool

GHAH

Line of action

Compiler

&



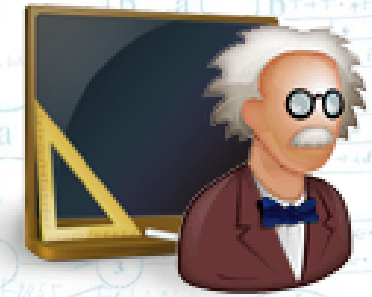
Automata

Compiler Automation Tool

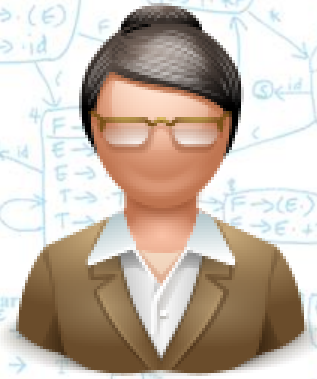
GHAH

Target Users

Students



Researchers



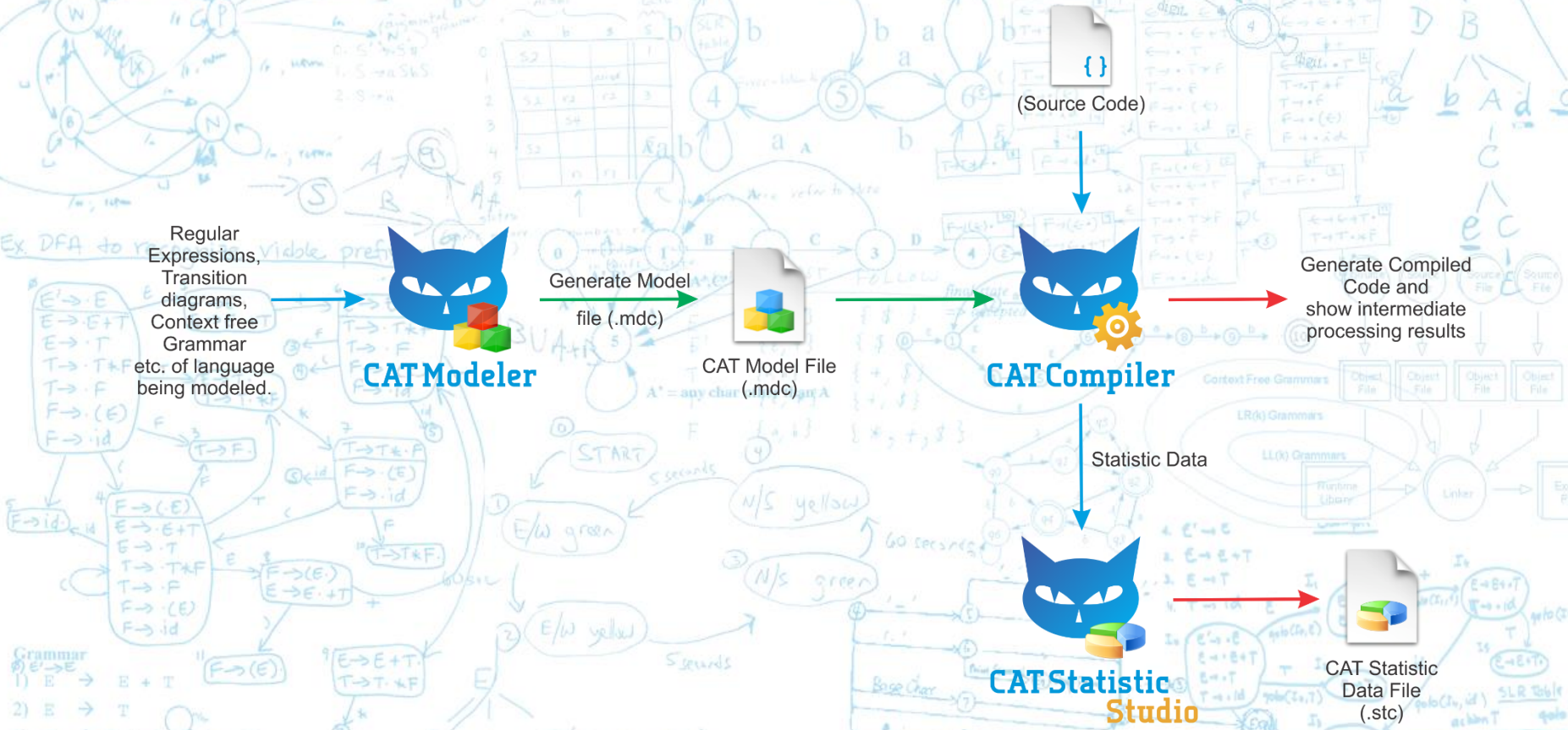
Teachers or Lecturers

Anyone else interested in compiler construction

Compiler Automation Tool

GHAH

CAT Architecture



Architecture of ‘Compiler Automation Tool’

CAT Modeler

The CAT Modeler is used to model the language under consideration. It the primary step for using CAT in which the user decides upon a language and try to model it using regular expressions, transition diagram, grammar etc. Once, finished all the information is then stored in a model file. Certain features of CAT Modeler are :

- Well structured and easy to use GUI.
- Generate parse tree, NFA, DFA in one go by specifying regular expression and utility to simulate using a test case.
- Design transition diagram and simulate it.
- Parsing toolkit generates all grammar related processing such as elimination left recursion, left factoring, LL1, SLR, CLR, LALR parsing table, Error recovery, simulation in just a click of a button.
- Graphical representation of all automata and transition diagrams.

CAT Compiler

The CAT Compiler is the area were all action take place. The model generated in previous discussion is uploaded into it. Various Source code are then used to get compiled using this model. The compiler works accordingly to the model specifications. Various features of CAT Compiler are :

- Displays intermediate compiler phase results separately, along with the symbol table and error specifications if any.
- Record compilation performance of individual source code and collect a rich set performance data.
- Seamlessly passes the data to CAT Statistic Studio for analysis.
- Tracks system details and performance such as memory usage and processor usage.

CAT Statistic Studio

The CAT Statistic Studio processes the data gathered by CAT Compiler to generate statistical information suitable for analytical learning and reasoning about the performance of the compiler and efficiency of the model designed. Various features include :

- Receives data from CAT Compiler and process it.
- Represents information in graphical manner by plotting graphs between chosen metrics.
- Allows to compare two or more graphs simultaneously.
- The graphs generated can be zoomed, resized or saved to image file as per user choice.
- 'Publish to PDF' option allows to generate report of complete analysis.
- 'Collect for Output' option allows user to gather all files such as model file, statistic file, source codes etc. into single portable folder.
- User can save data into a statistic file and can also upload it later when required.

Some misconception about the project

- Compiler Automation Tool is not a compiler that translates the source code into machine language and execute it. Here, we automates the task of compilation bringing out various decisions and intermediate results that generated at various phases.
- The tool turns the traditional black box compiler into a white box compiler. So, we are more concerned about how the compiler works rather than just making code execute.
- CAT is not fixed to a single language. It simply works the way the user models the programming language. This language can be any recognized language such as C, C++ , Java etc. or user developed customized language.

Limitations

- Although CAT is designed to model a large set of programming languages, yet there may be some languages that seem difficult to be described and study using CAT.
- CAT captures only general features of the language under consideration. There are certain specific features related to the languages that are difficult to model or perhaps CAT does not provide any way of modeling them.
- There exist certain limitations with respect to CAT Modeler. These are as follows:
  - Regular expressions does not take into account '?' (zero or one instance). Expressions using '?' have to be expanded using '|'. This increases the length and complexity of the expression.
  - Limited set space is available. User can use maximum of 25 (a-y) set.
  - Wastage of set space when specifying single character. For instance, when specifying quote in regular expression, user must first define a set containing only quote character. This causes wastage of limited set space.

- Difficult to model operator whose nature depends upon the operands. For example, '>>' operator is regarded as shift operator as well as extraction operator in C++.
- Does not allow multiple line strings. These are considered as errors later by CAT Compiler.
- There is nearly no way for CAT to identify Ambiguous grammar entered by the user. Thus, the user must be very careful while entering grammar.

➢ CAT Compiler may take time to load long codes.

➢ No other language other than English is supported.

Compiler Automation Tool

GHAH

Technology Used

Java™

Programming Environment

NetBeans IDE 7.2.1

Java SE Development Kit 6

Photoshop CS5

(Image Editing)

CorelDRAW GRAPHICS SUITE X5

(Vector Graphic Designing)

Thank You

Compiler Automation Tool

Pile of sheets now just a click away

GHAH

Presented By :

Amarpreet Singh (08/CSE1/2009)
Gagandeep Singh (04/CSE1/2009)
Hargeet Kaur (03/CSE1/2009)
Harpreet Kaur (15/CSE1/2009)