



Institute of Technology of Cambodia

Department of Information and
communication Engineering

Project Report

Project: Finite Automata Program

Team: C2

Lecturers

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Subjects

Automata Theory

Algorithm and Programming

Database

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List of Role in Group #C2

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I. Introduction

This is a project about the Finite Automata Program. The project combined 3 subjects together Algorithm and programming, Automata Theory and Database. We used C/C++ programming language in Code Block for our process. The goal of the projects to develop an application to manage and manipulate Finite Automata. So, it can be used for create FA (DFA, NFA), load data from database, test string accepted or reject, Minimized DFA, Convert NFA to DFA, Deleted FA, Display DFA table.

II. Functions and features

There are 9 functions and some features of this program. There are:

1. Create FA

This function, there are 2 types of FA: DFA & NFA. Then user need to choose type DFA or NFA by typing. All data will be store in Database automatic, And user has to input:

Description : (whatever)

Symbols : (Example: a, b,...)

Numbers of state : (Example: 2, 3,...)

Final states : (one, more than one)

Number of Transition : (Example: 2, 3,...)

2. Load FA from Database

After create FA and store data in database, User need to choose this option to get data from database.

3. Display Transition Table

This function allows user to choose this option to view FA table.

4. Test string

This function allows user to choose this option to test whether string is accepted or rejected.

5. Convert NFA to DFA

This function, it allows user to choose this option to construct an equivalent DFA from a NFA.

6. Minimized DFA

This function allows user to choose this option then it will show a new table of DFA.

7. Deleted FA

This function allows user to choose this option then input ID of file which user want to delete. We build this function too delete information is FA table, State table, alphabet table and transition table. Then will delete database successfully.

8. Design

This function use some code to design UI.

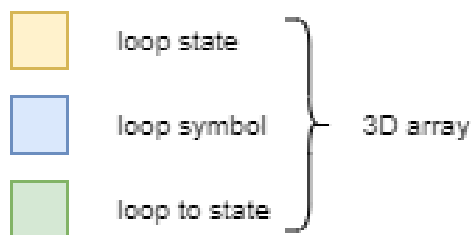
9. Exit

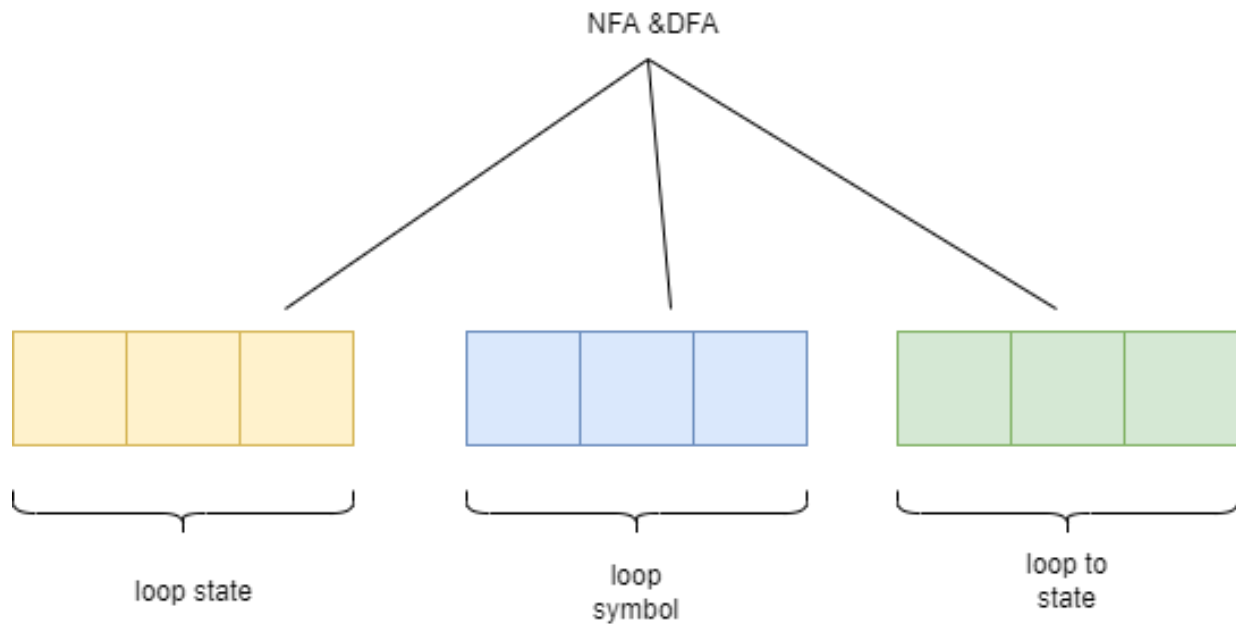
This function was created to exit from program.

III. Data Structure

We design data structure for FA. Firstly program get data from user input All data have data type as a string. Then we use array structure to compute DFA and NFA.

DFA & NFA: We use array structure to get data. When we test string. It easy to check characters in string and insert data in data server. When we test string, Queue will check that string is accepts or reject easily because queue is mark with final states when data inputted.





IV. Database Design

We decided to create 4 tables: one to store information of FA, two table are State table and alphabet table have to related with FA table. And one more table store information of transition. NFA and DFA we built the same tables. To illustrate the database structure of our group, we drew table and diagram to show about their connections to describe the designs and their structures.

➤ FA Table

id	Fa_type	description
9	DFA	Define name

➤ State Table

fa_id	state	start_state	final_state
9	5	q0	q3,q4

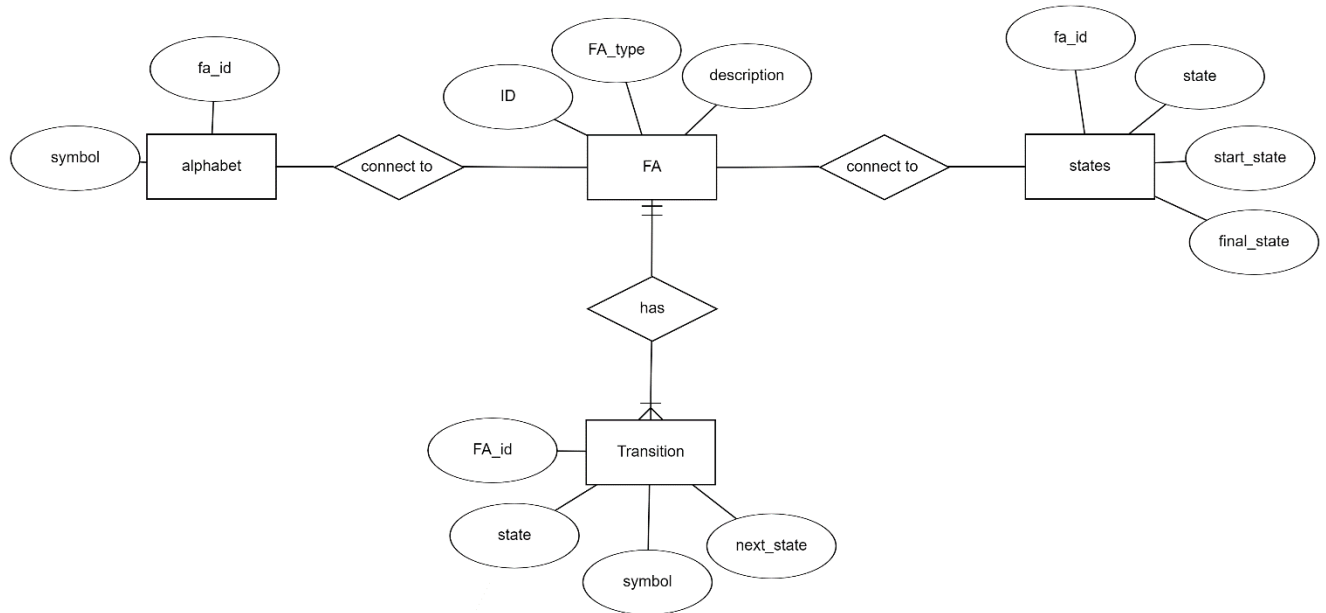
➤ Alphabet Table

fa_id	symbol
9	a,b

➤ Transition Table

fa_id	state	symbol	next_state
9	5	a	q1
9	5	b	q2

❖ FA Diagram



V. Implementation

1) Create FA

When user input data of FA (DFA or NFA). All data will be auto store in Database.

2) Test string

When user test string DFA or NFA, the program open data-server for get data. And program holds data in variable and user can test whether string is accepted or rejected.

3) Convert NFA to DFA

When user to selects this option, the program open data-server for get data. The program determine new transitions and add new states. Finally it convert, we got new DFA and after it done the data will transport into DFA (view).

4) Minimized

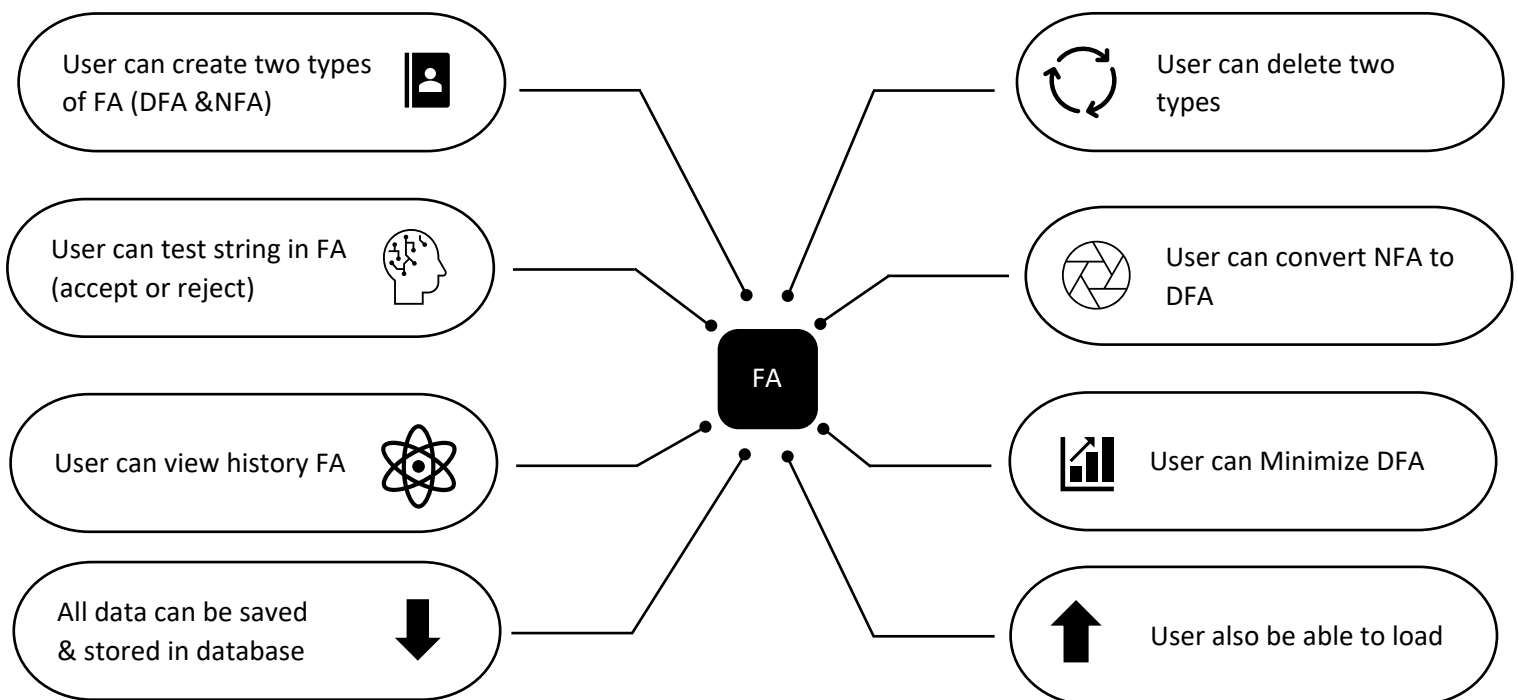
When user select minimize option, the program open data-server for get data. And Program compute by Linked-List to fine the states that are the same state. Then program will create new DFA(Minimize). We can view new DFA(Minimize).

5) Database Implementation

All options in the program are connected into database to stored data and load data when we need to use. The users can store their input FA to the database and they can get the data back to work with other options. we decided to work with sqlite3 because it easy use. and easy to insert query and get data. Moreover, we can know data recorded success or unsuccess. If user want to delete FA file they just choose option delete with choose ID file to delete then the program will be delete in Database too.

VI. Results

This program we used coding to designed UI. It is useful and easy to use for user.



VII. Conclusion & Perspective

To summarize in the conclusion, in order to achieve the project as well as possible. Each member absolutely participated in every single discussion both at school and in the online meeting. After working on this project, we have faced many challenges such as a lack of lectures so we tried to review lessons from chapter 3 to chapter 5, which were also associated with our project. Furthermore, we try to work hard on this project and everyone freely share their idea and other resources with the team and combined ideas together.