Compiler Construction: Assignment 2

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1 Assignment 6: Thompson's Construction

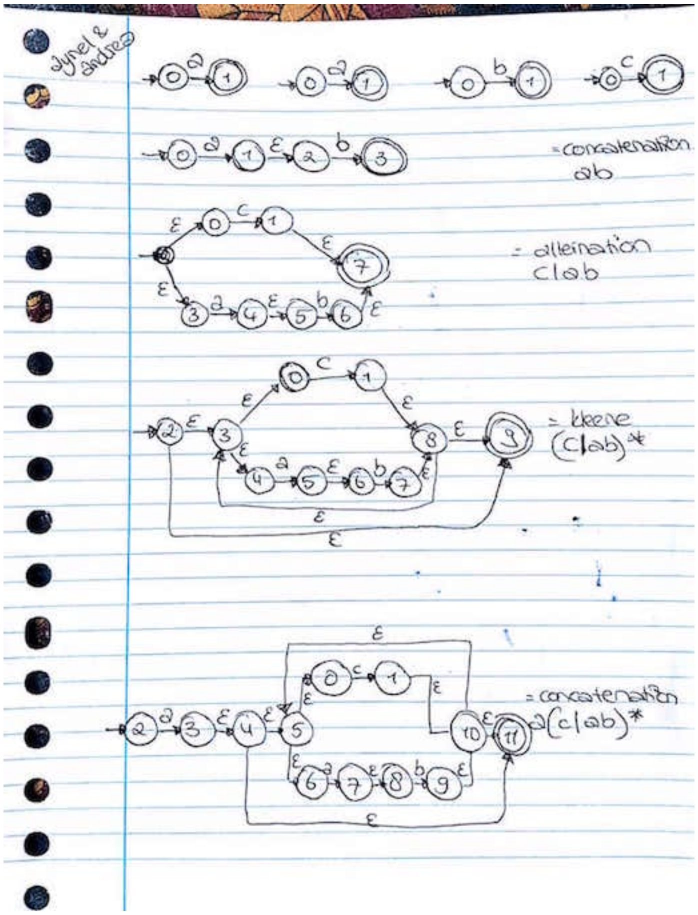


Figure 1: *Concatenation, Alternation and Kleene closure*

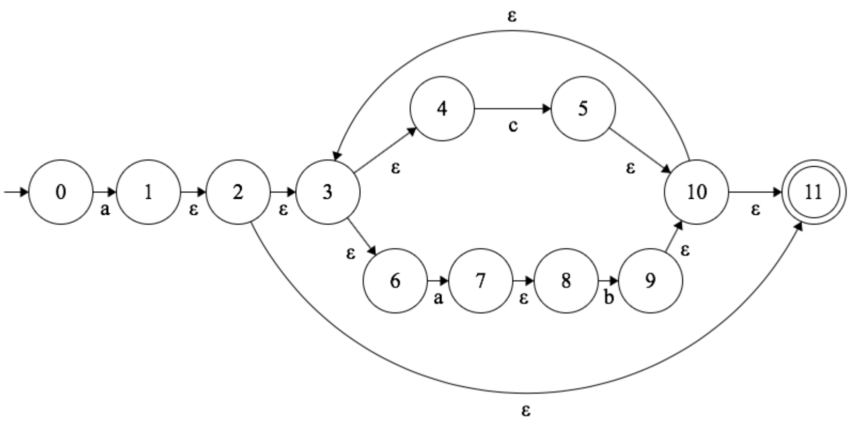
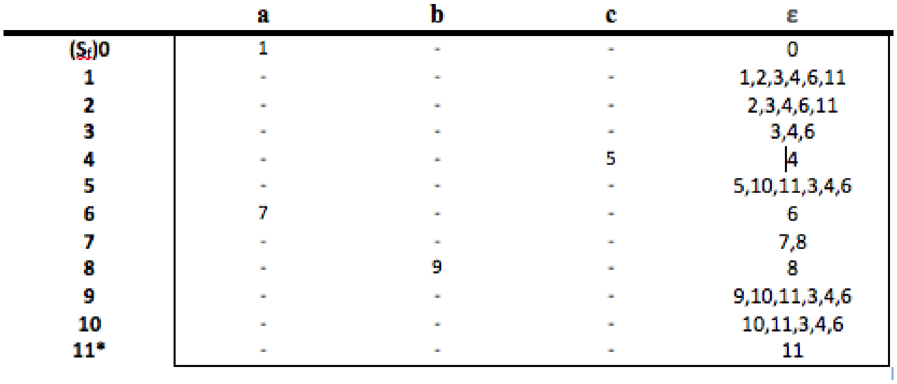


Figure 2: *NFA*

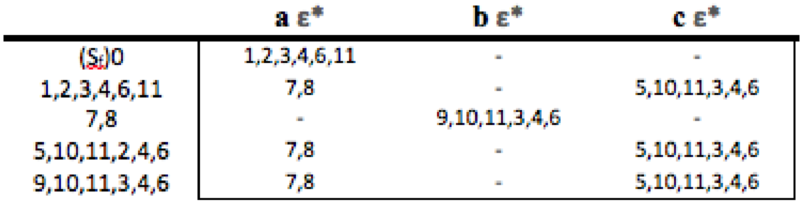
2 Assignment 7: Subset Construction

Step 1: Create transition table(s)



	a	b	c	ε
(S_t)0	1	-	-	0
1	-	-	-	1,2,3,4,6,11
2	-	-	-	2,3,4,6,11
3	-	-	-	3,4,6
4	-	-	5	4
5	-	-	-	5,10,11,3,4,6
6	7	-	-	6
7	-	-	-	7,8
8	-	9	-	8
9	-	-	-	9,10,11,3,4,6
10	-	-	-	10,11,3,4,6
11*	-	-	-	11

Figure 3: *Compute e-closure transition table*



	a ε*	b ε*	c ε*
(S_t)0	1,2,3,4,6,11	-	-
1,2,3,4,6,11	7,8	-	5,10,11,3,4,6
7,8	-	9,10,11,3,4,6	-
5,10,11,2,4,6	7,8	-	5,10,11,3,4,6
9,10,11,3,4,6	7,8	-	5,10,11,3,4,6

Figure 4: *Compute the transition table*

Step 2: Subset construction

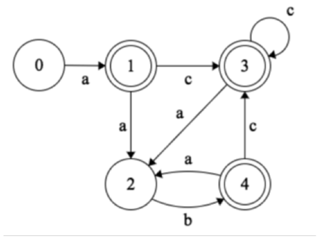
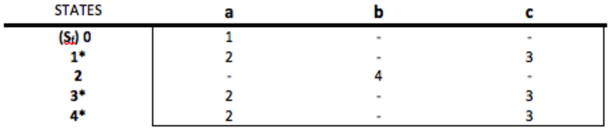


Figure 5: *DFA*

3 Assignment 8: Hopcroft's Algorithm

Step 1: Create a transition table



STATES	a	b	c
(S_t) 0	1	-	-
1*	2	-	3
2	-	4	-
3*	2	-	3
4*	2	-	3

Figure 6: *Transition table*

Step 2: Hopcroft Algorithm
0-equivalence: {0, 2}, {1, 3, 4}
1-equivalence: {0}, {2}, {1, 3, 4}

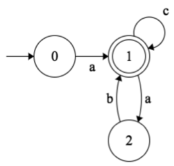


Figure 7: *Minimized DFA*

4 Assignment 9: Direct-coded Scanner

```

#include <stdio.h>

int main(void) {
    int a = scanner();
    printf("%i\n", a);
    return 0;
}

int scanner(void) {
    char c;

    state_init: c = getchar();
                if (c == 'a')
                    goto state_1;
                else
                    goto state_error;

    state_1:    c = getchar();
                if (c == 'a')
                    goto state_2;
                else if (c == 'c')
                    goto state_1;
                else if (c == '\0')
                    goto state_success;
                else
                    goto state_error;

    state_2:    c = getchar();
                if (c == 'b')
                    goto state_1;
                else
                    goto state_error;

    state_success:  return 0;

    state_error:    return 1;
}
```

Listing 1: Direct-coded scanner example