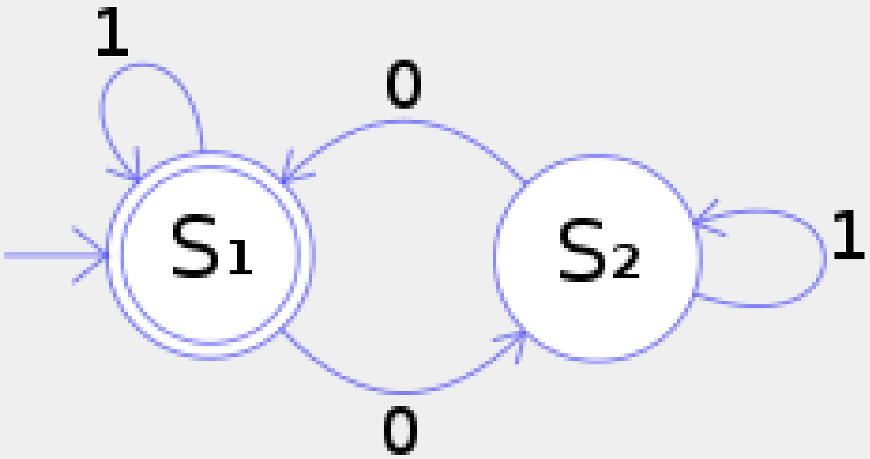
KMP DFA

Into & Live Coding

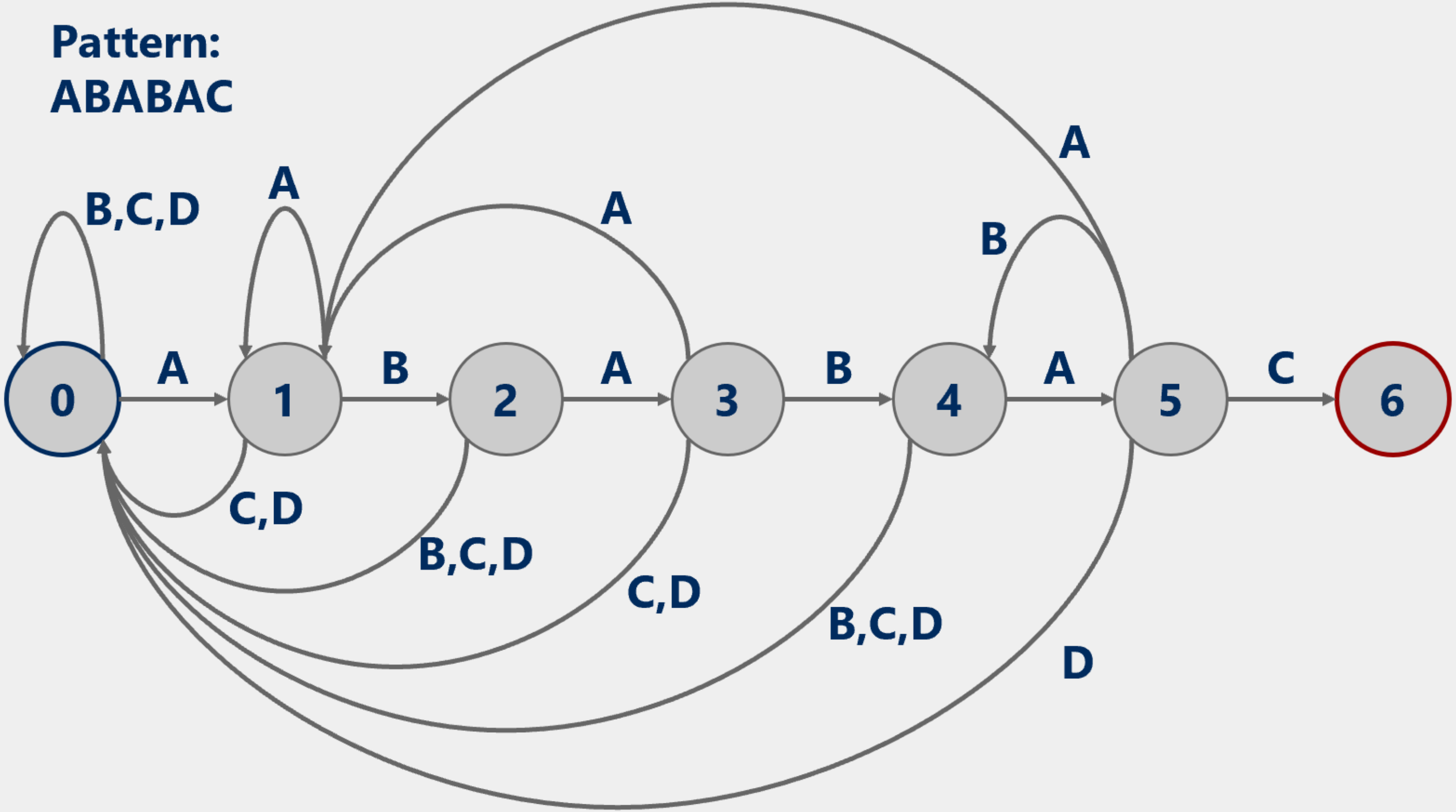
Wut?

- KMP = Knuth Morris Pratt
- DFA = Deterministic Finite Automaton
- https://youtu.be/X7HmltUWXgs?t=32



KMP DFA

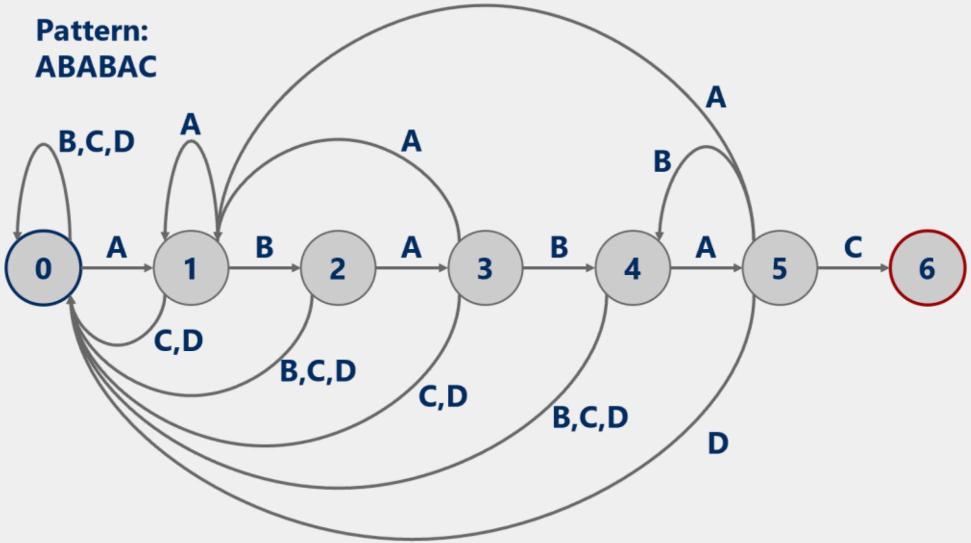
Pattern:
ABABAC



KMP DFA

Searching for ABABAC in ABABABAC

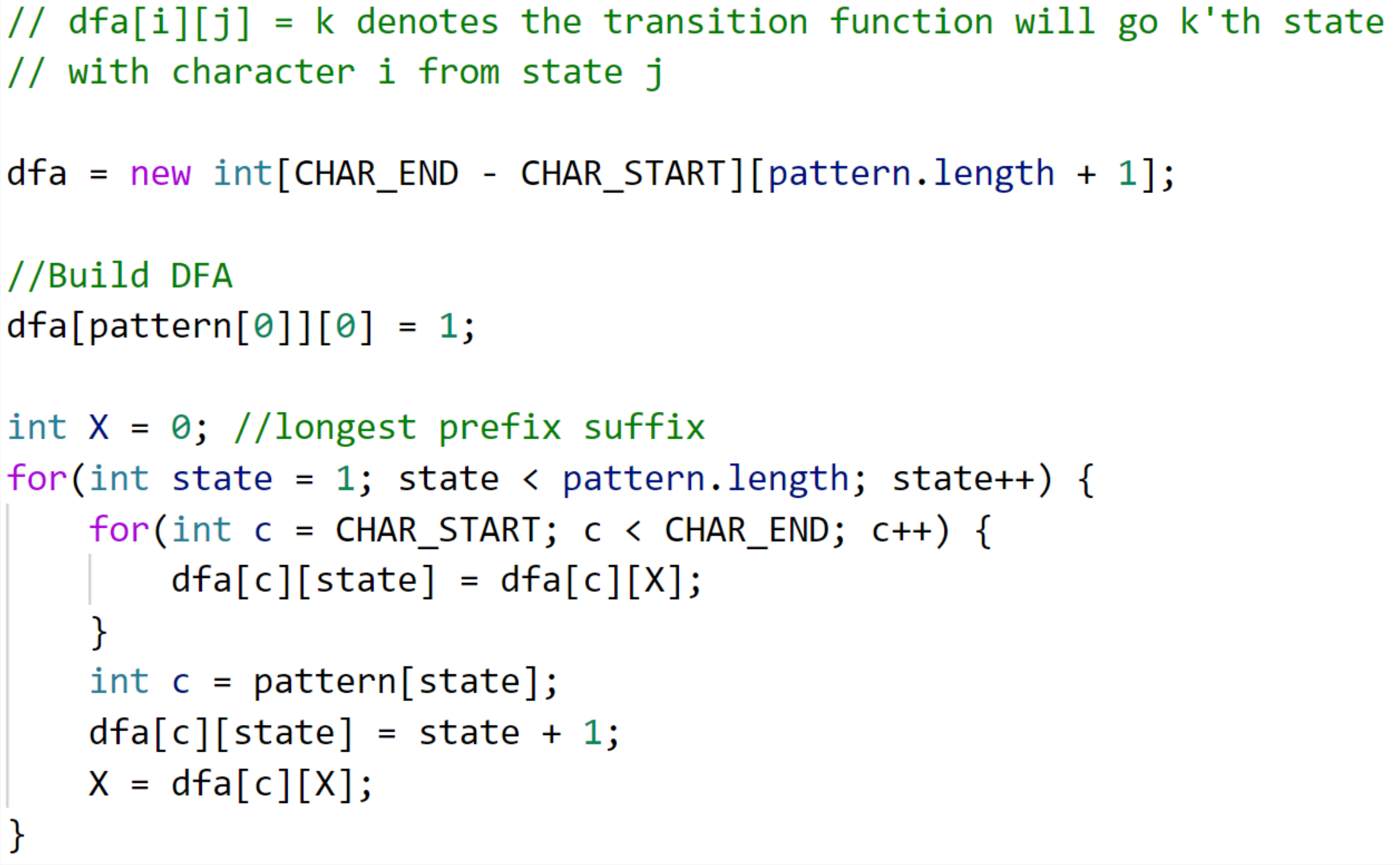
Character	State
Initial	0
A	
B	
A	
B	
A	
B	
A	
C	



Reverse-Engineering

- Looking at code, figure out what it’s doing.
- Often useful when implementing complicated algorithms.

Reverse-Engineering



```
// dfa[i][j] = k denotes the transition function will go k'th state
// with character i from state j

dfa = new int[CHAR_END - CHAR_START][pattern.length + 1];

//Build DFA
dfa[pattern[0]][0] = 1;

int X = 0; //longest prefix suffix
for(int state = 1; state < pattern.length; state++) {
    for(int c = CHAR_START; c < CHAR_END; c++) {
        dfa[c][state] = dfa[c][X];
    }
    int c = pattern[state];
    dfa[c][state] = state + 1;
    X = dfa[c][X];
}
```

Think About

- Let’s write Search!