DFA Construction - VII

Complete Course on Theory of Computation

Subbarao Lingamgunta • Lesson 11 • Feb 16, 2022

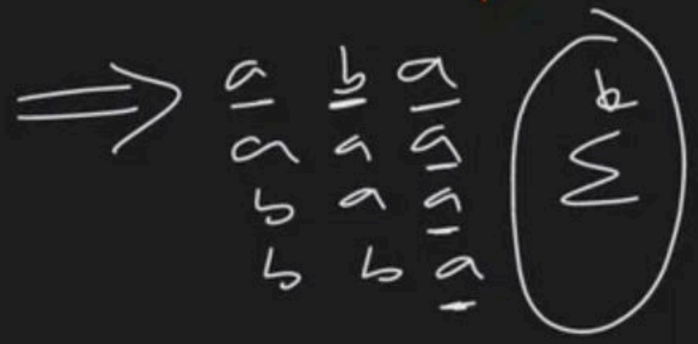
DFA Construction - VI

Complete Course on Theory of Computation

Subbarao Lingamgunta • Lesson 10 • Feb 15, 2022

cm-DFA $L = \{$ Set of all strings of a's & b's where a in every string 3rd symbol from LHS is a $\}$

$\Sigma = \{a, b\}$

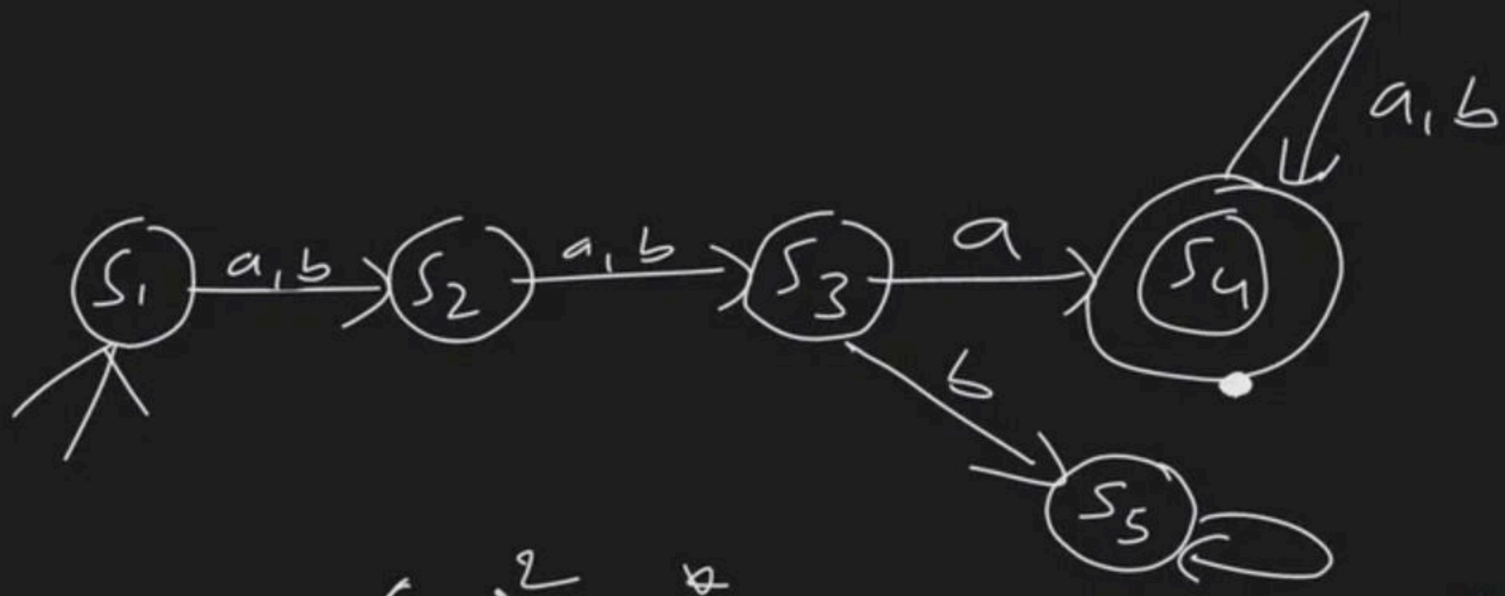


3rd – LHS – a ⇒ 4+1 = 5

100 – " – " ⇒ 101+1

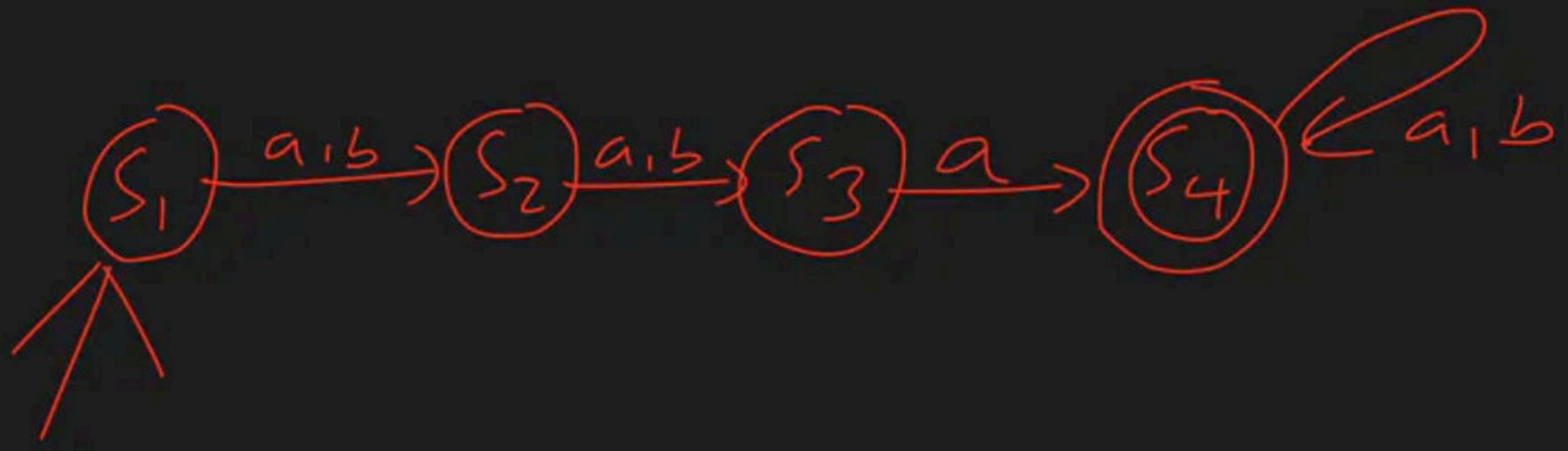
n – " – " ⇒ n+1+1

n+2



$(\Sigma)^2 a (\Sigma)^*$

3rd - Symbol from LHS - a $\Longrightarrow$ NFA

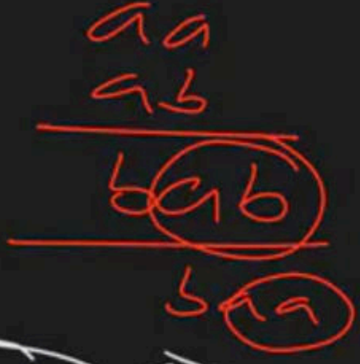


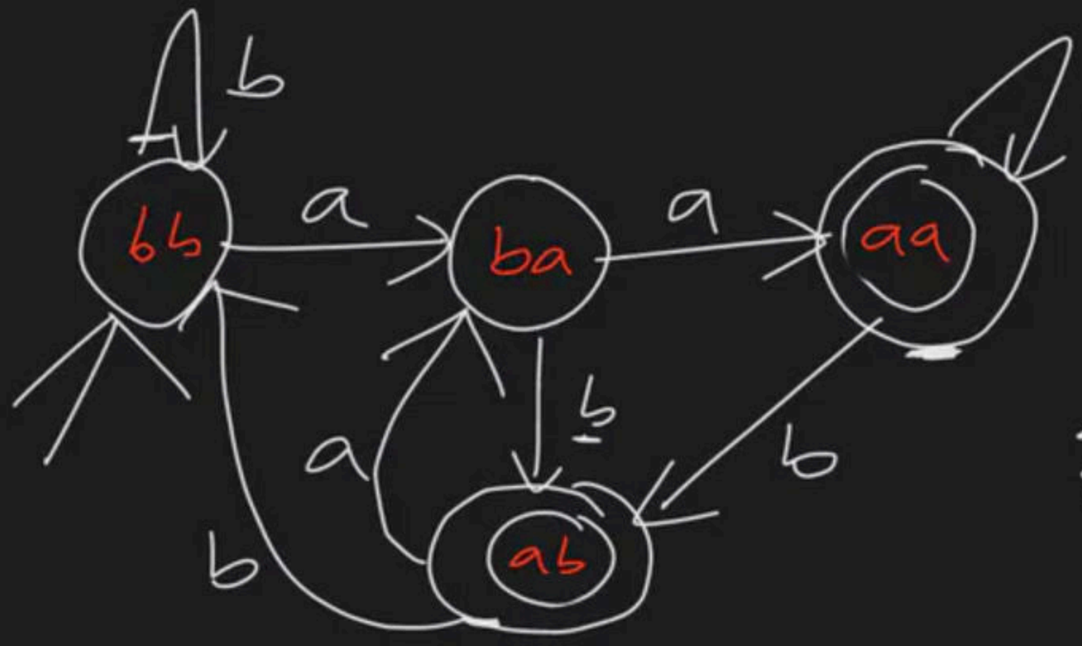
NFA $\Longrightarrow$ 3 - LHS $\Rightarrow$ 4

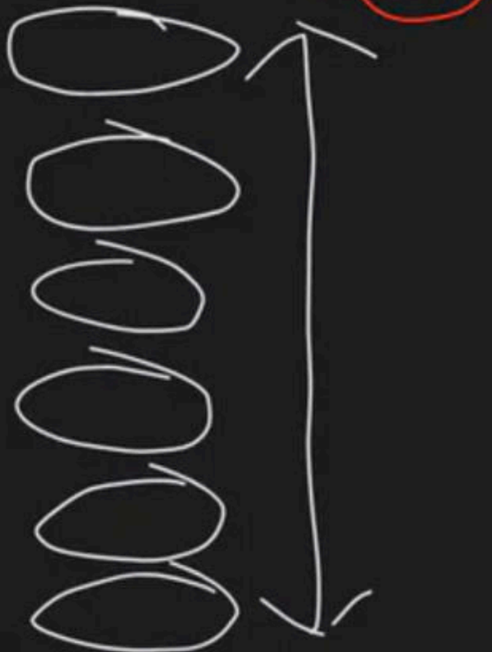
n - LHS $\Rightarrow$ n+1

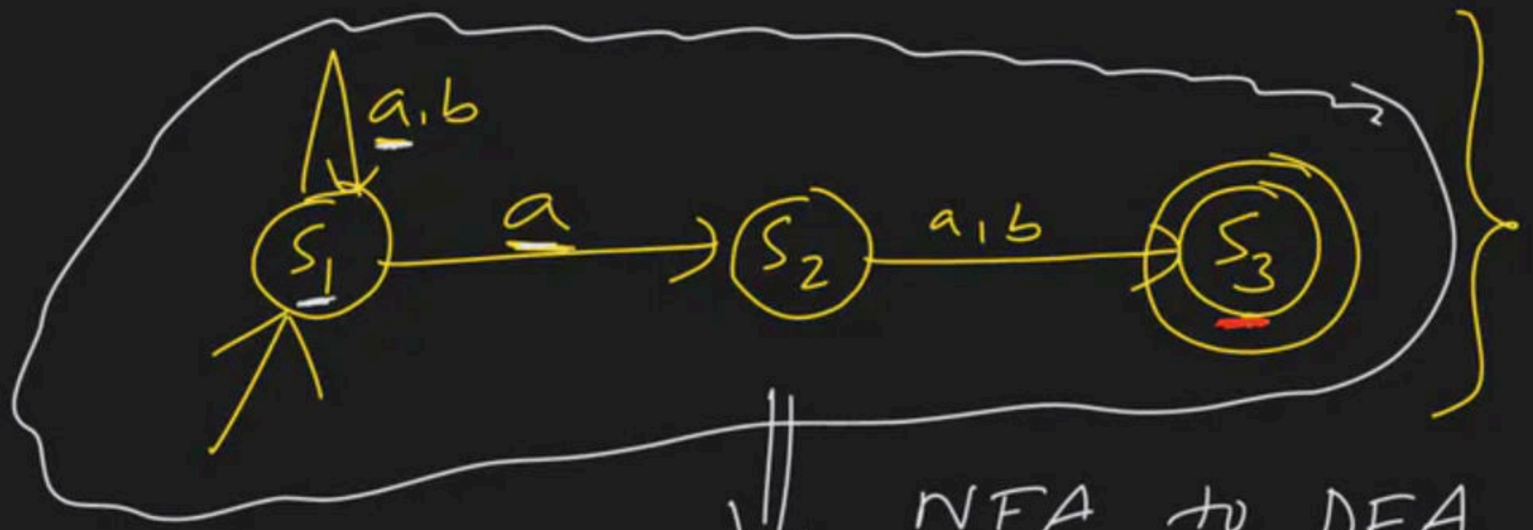
CM-DFA $L = \{$ Set of all strings of a's & b's where in every string 2nd symbol from RHS is a $\}$

$\Longrightarrow (\varepsilon^{*}) (a\ a) \Longrightarrow \Sigma^{*} a \Sigma^{1} \Longrightarrow aa, ab,$ 





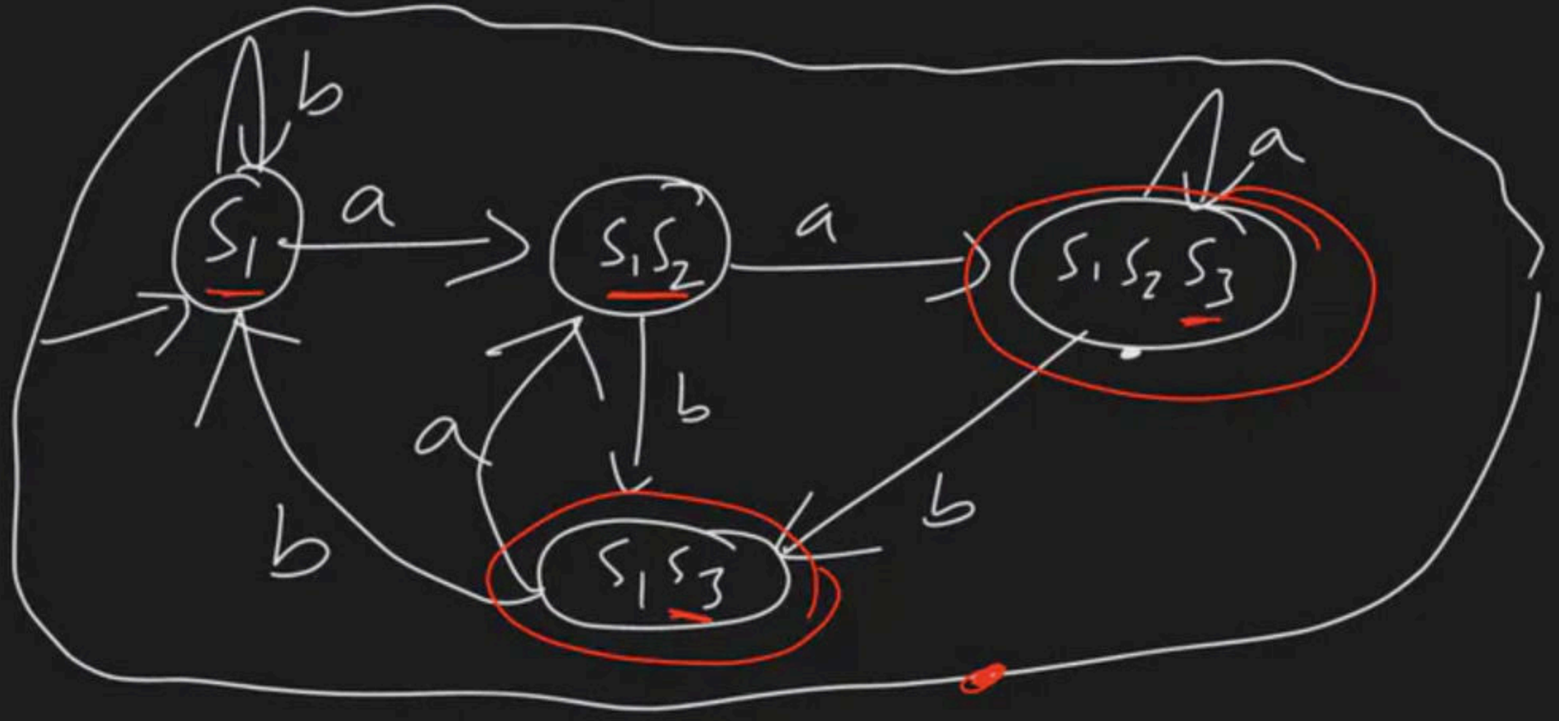




2nd RHS - a ⇒ NFA

3 - states

NFA to DFA conversion



20

$S_1S_3 \xrightarrow{a} S_1S_2$

$S_1S_3 \xrightarrow{b} S_1$

$S_1 \xrightarrow{b} S_1$

$S_1S_2 \xrightarrow{b} S_1 \xrightarrow{b} S_1$

$S_2 \xrightarrow{b} S_1S_2$

(1) Take NFA start state

(2) apply all symbols from Σ one by one.

(3) if new state continue 2nd step.

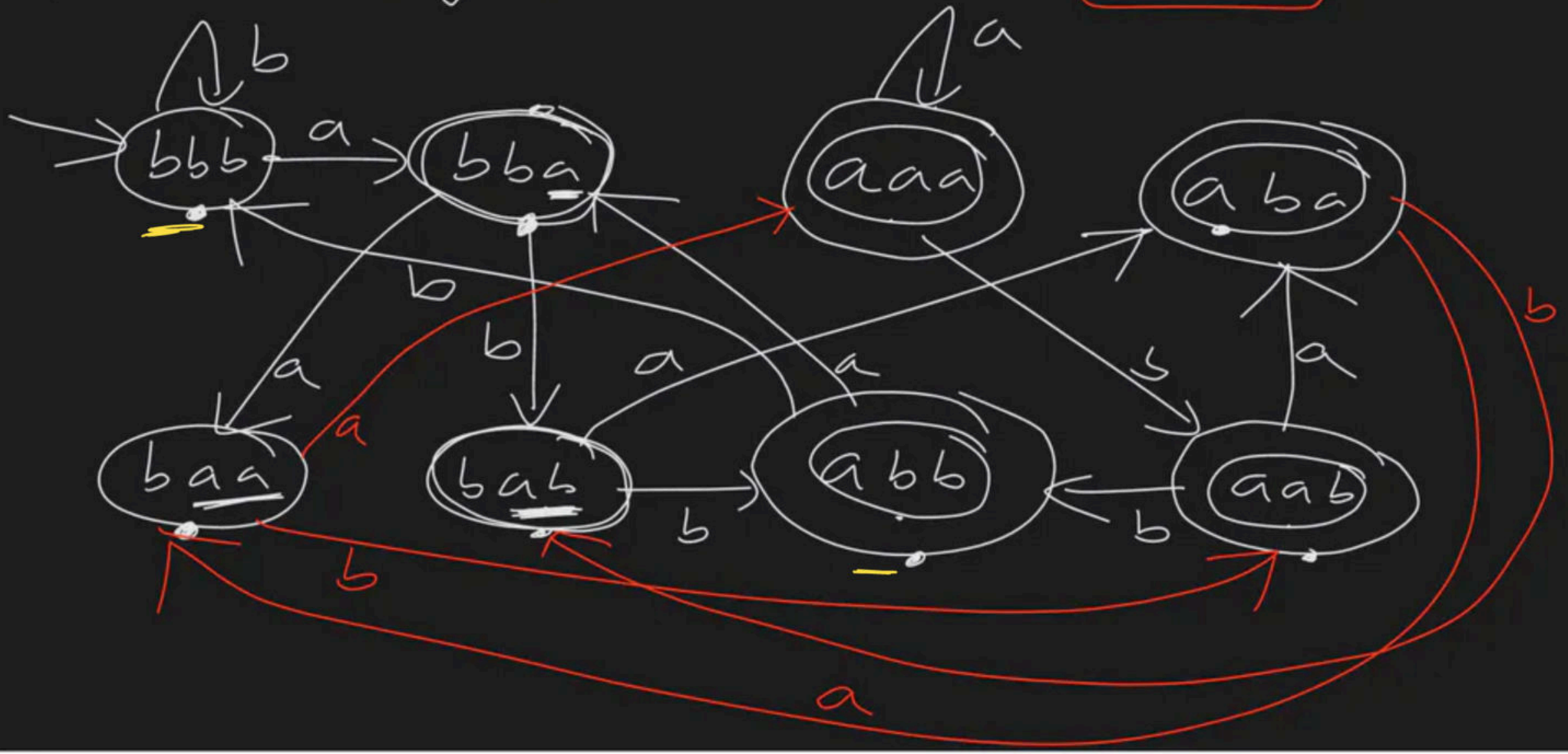
(4) while applying transitions see NFA.

(5) NFA find where is present in DFA
make them as Final.

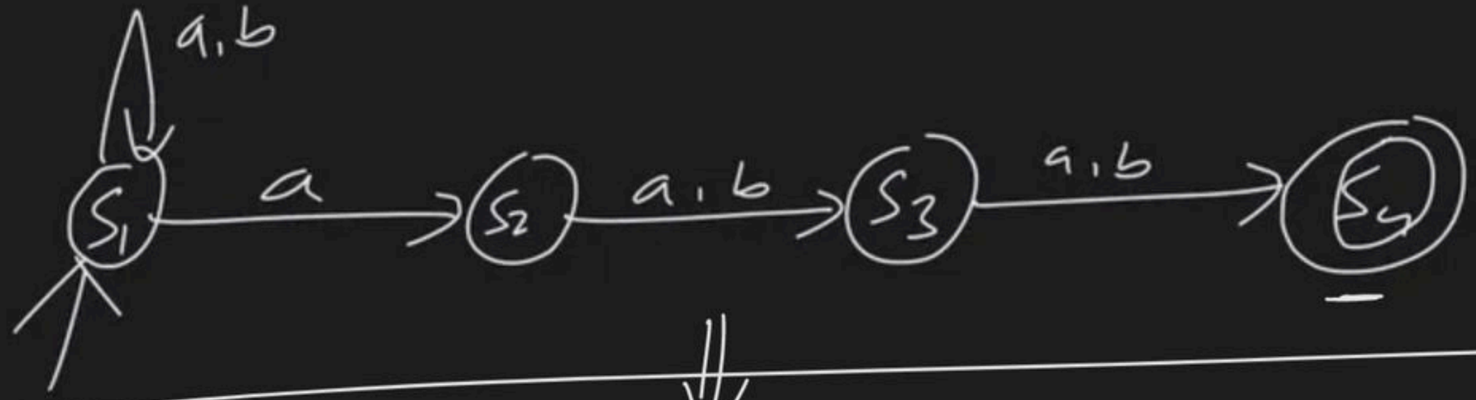
(6) if no new state stop.

3rd symbol to come RHS is a

$\Longrightarrow$ Last 3-symbols Target $\Longrightarrow$ a(aa / bb)



3rd symbol – RHS – a } NFA.



4-states

E.V-yes

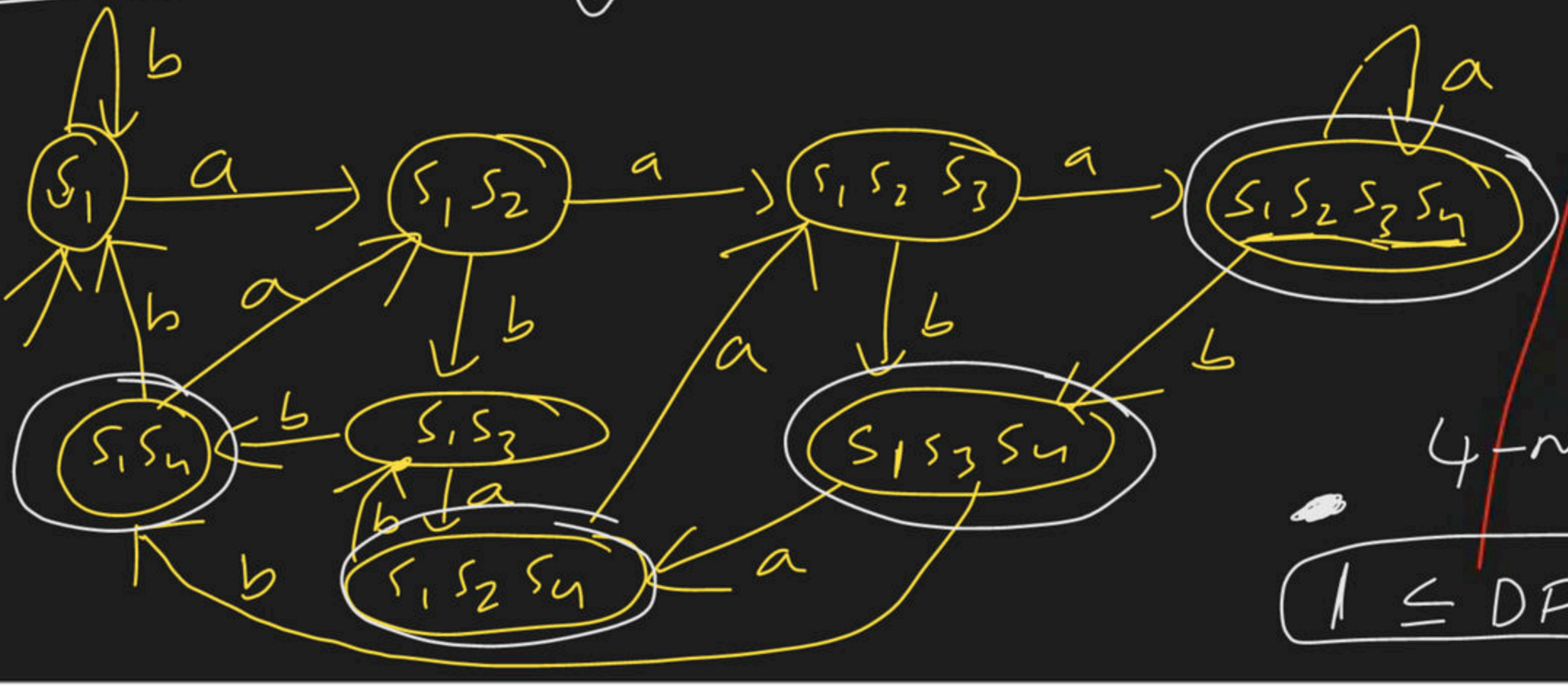
1-IV also

don't say yes

few-invalid

4-NFA

1 ≤ DFA ≤ 16



2^{nd} — RHS − a $\Longrightarrow z^2$

3^{rd} — RHS − a $\Longrightarrow z^3$

n^{th} — RHS − a $\Longrightarrow z^n$

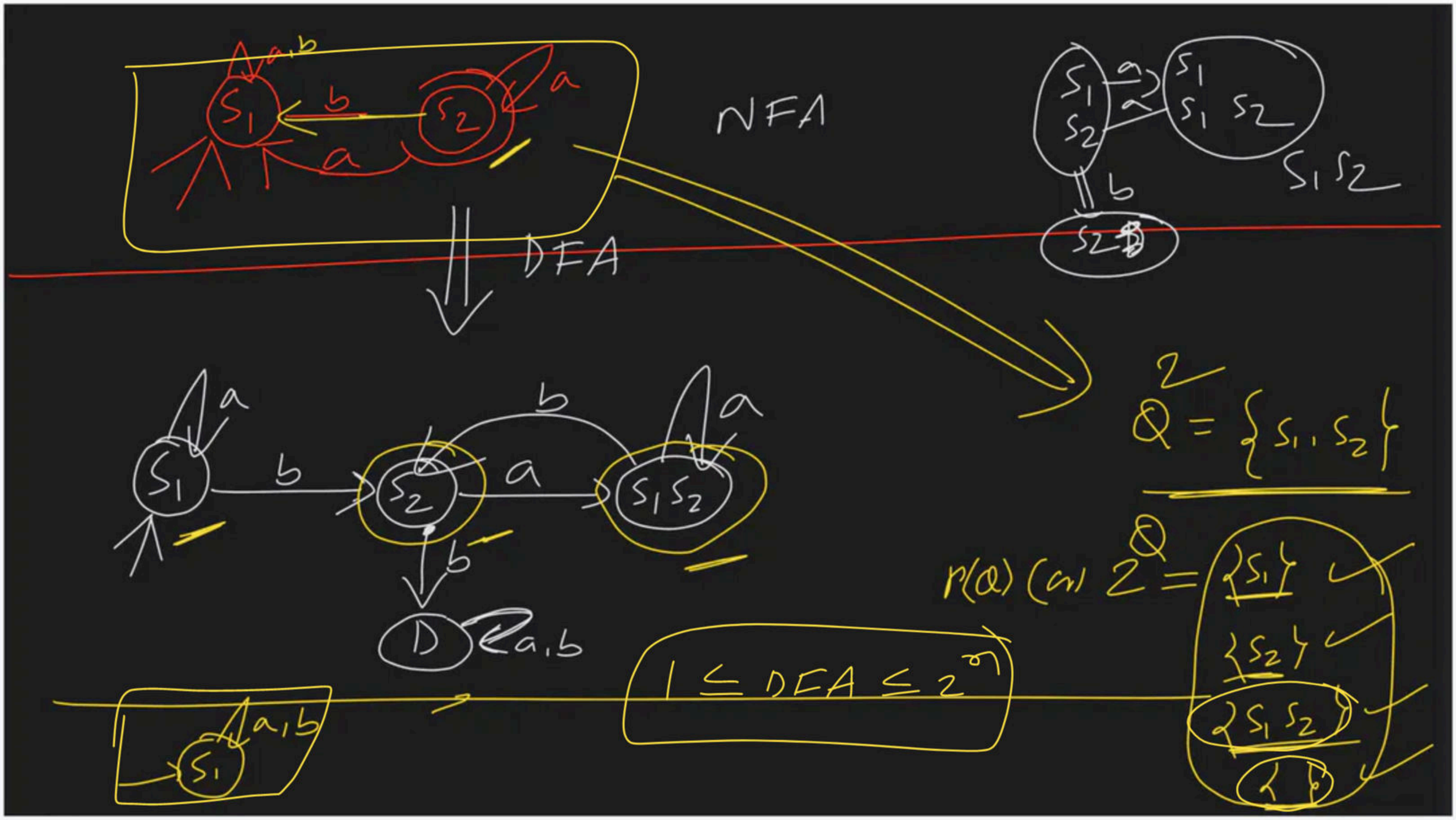
} DFA

2^{nd} — RHS − a $\Longrightarrow 3$

3^{rd} — " " $\Longrightarrow 4$

n^{th} — " " $\Longrightarrow n+1$

} NFA


a,b
S_1
b
S_2
a
a
NFA
DFA
S_1 S_2
a
S_1 S_2
b
S_2 ϕ
S_1 S_2
a
b
a
S_1
b
S_2
a
S_1 S_2
b
D
a,b
$Q = \{S_1, S_2\}$
$P(Q)$ or 2^Q =
$\{S_1\}$
$\{S_2\}$
$\{S_1 S_2\}$
ϕ
$1 \leq DFA \leq 2^n$
a,b
S_1

If NFA contain n-states then equivalent DFA contain 2^n states [maximum]

~~min~~

~~eq~~

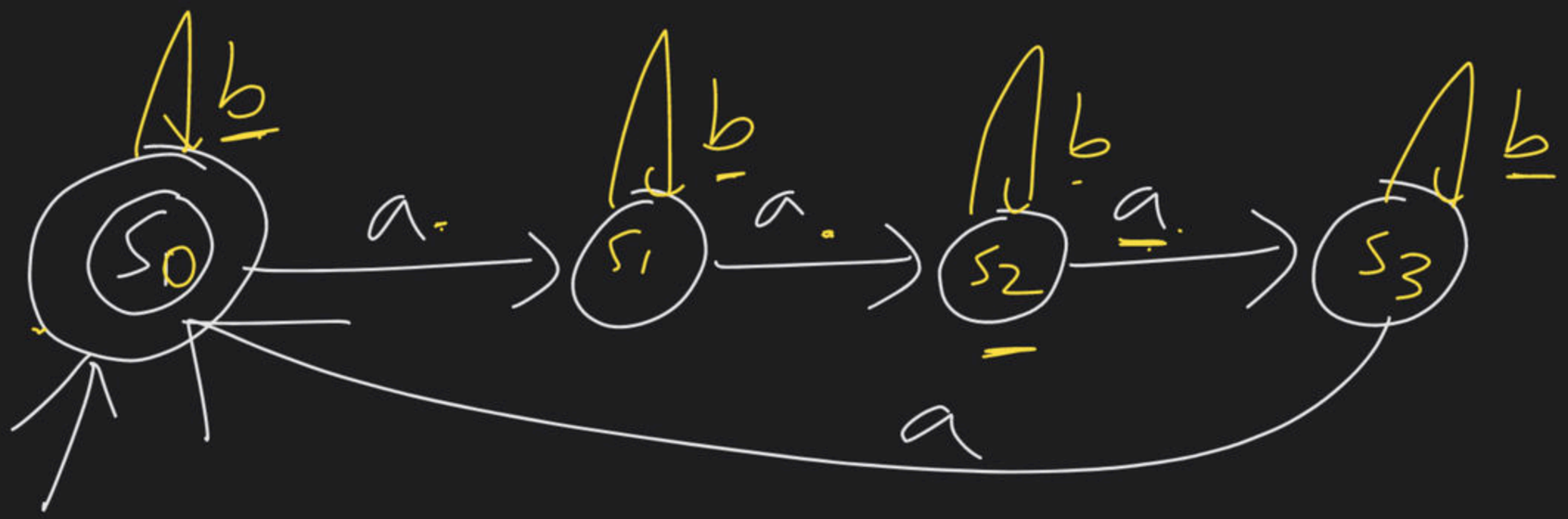
Bell call ⟹ 1

Thanks

Dedicate Hots

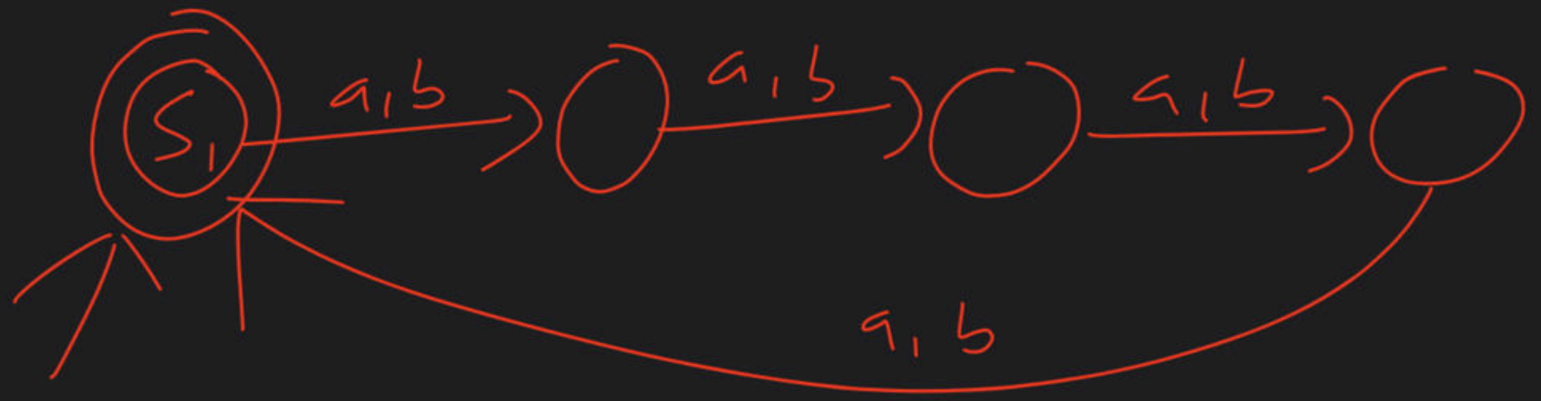
CM-DFA $L = \{$ Set of all strings of a's & b's where in every string no. of a's divisible by 4 $\}$

$\Longrightarrow$ 0, 4, 8, 12, 16, - - - - - - -



length of the string divisible - 4

$L \Rightarrow 0, 4, 8, 12, 16, \ldots$

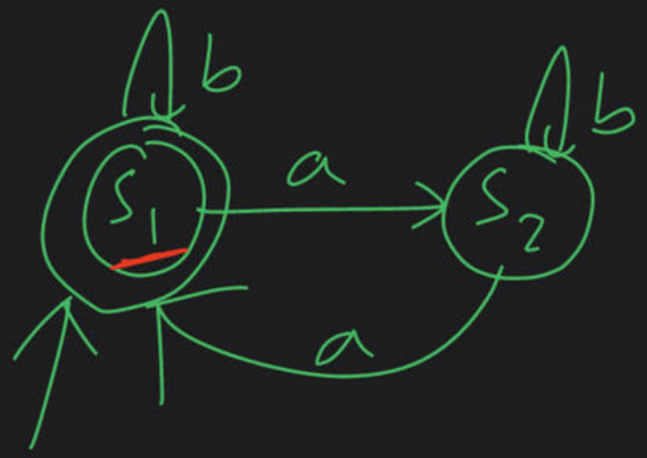


P CM-DFA $L = \{$ all strings of a's & b's where in every string no. of a's div-2 & no. of b's div-3 $\}$

P_1 P_2

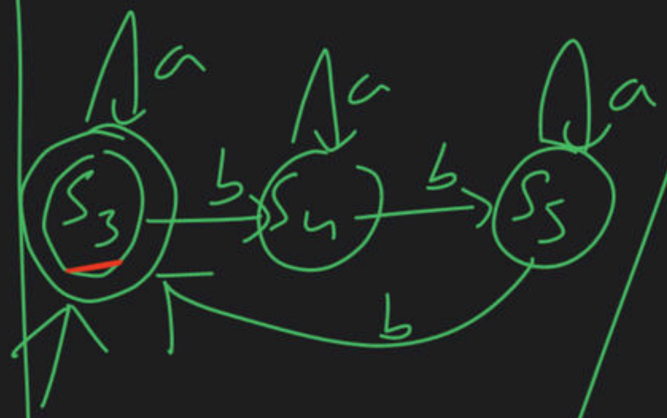
aabbb

P_1



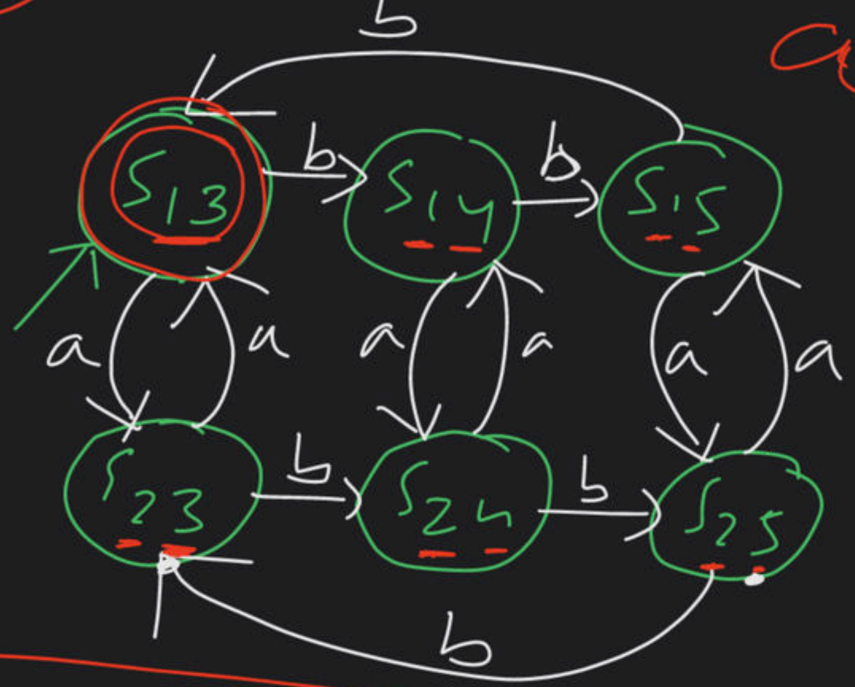
$\{S_1, S_2\}$

P_2 abbbba



$\{S_3, S_4, S_5\}$

bbb



aabbb

&& $\Rightarrow S_{13}$

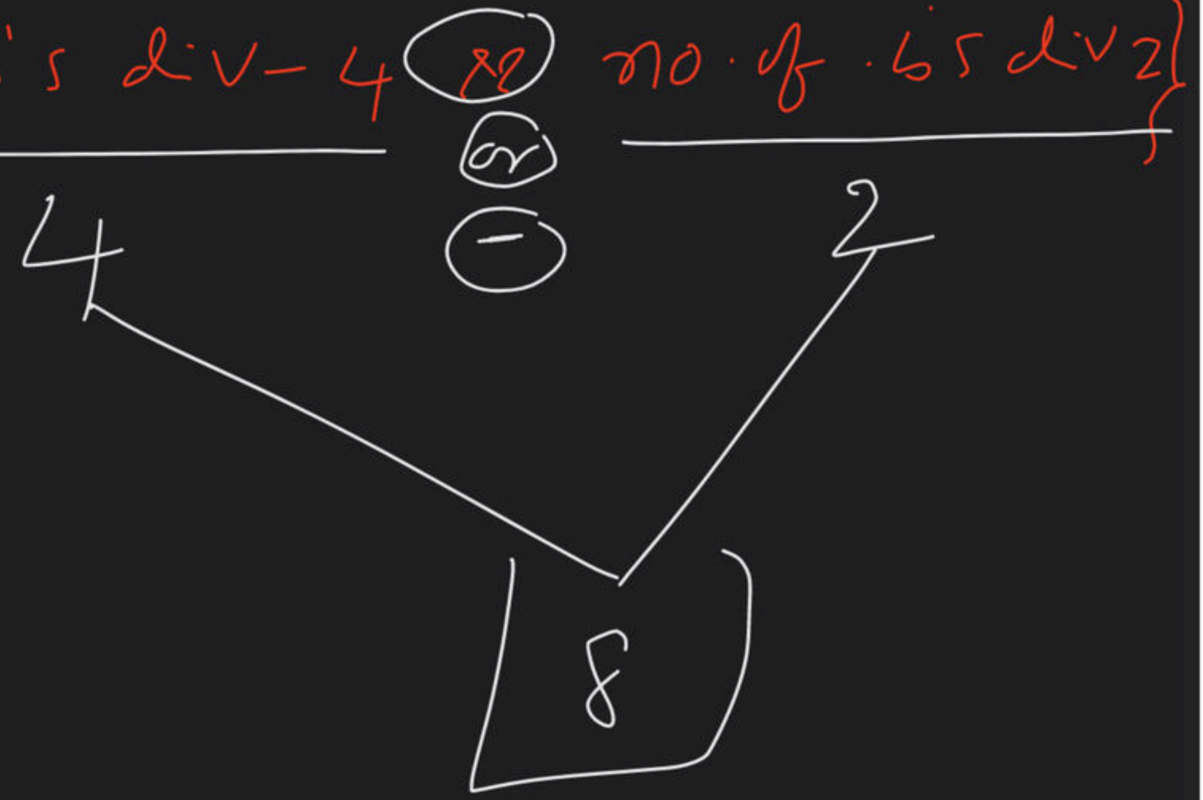
or $\Rightarrow S_{13}\ S_{14}\ S_{15}\ S_{23}$

$S_{14}\ S_{15}$

final state

CM - DFA $L = \{$ all strings of a's & b's where

empty contain $\underline{\text{no. a's div-4}}$ (or) $\underline{\text{no. of b's div 2}}\}$



CM-DFA $L = \{$ set of all strings of a's & b's

where no. of a's div 4 (or) no. of a's div 2 $\}$

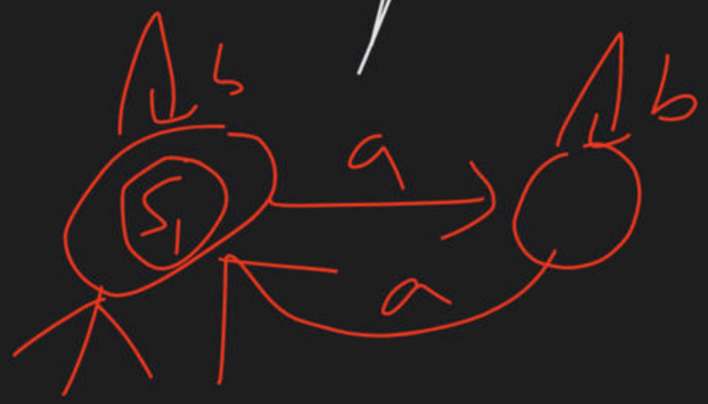
and

4

2

8

$\Rightarrow$ 0, 2, 4, 6, 8 / 10, ...



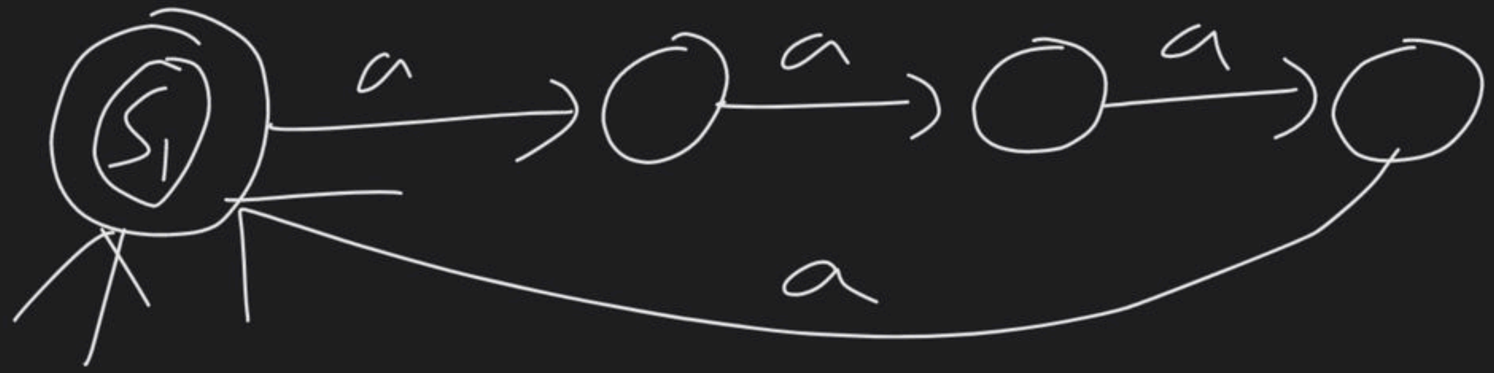
$\Rightarrow$ (25)

&

$\Rightarrow$ 0, 4, 8, 12, ...

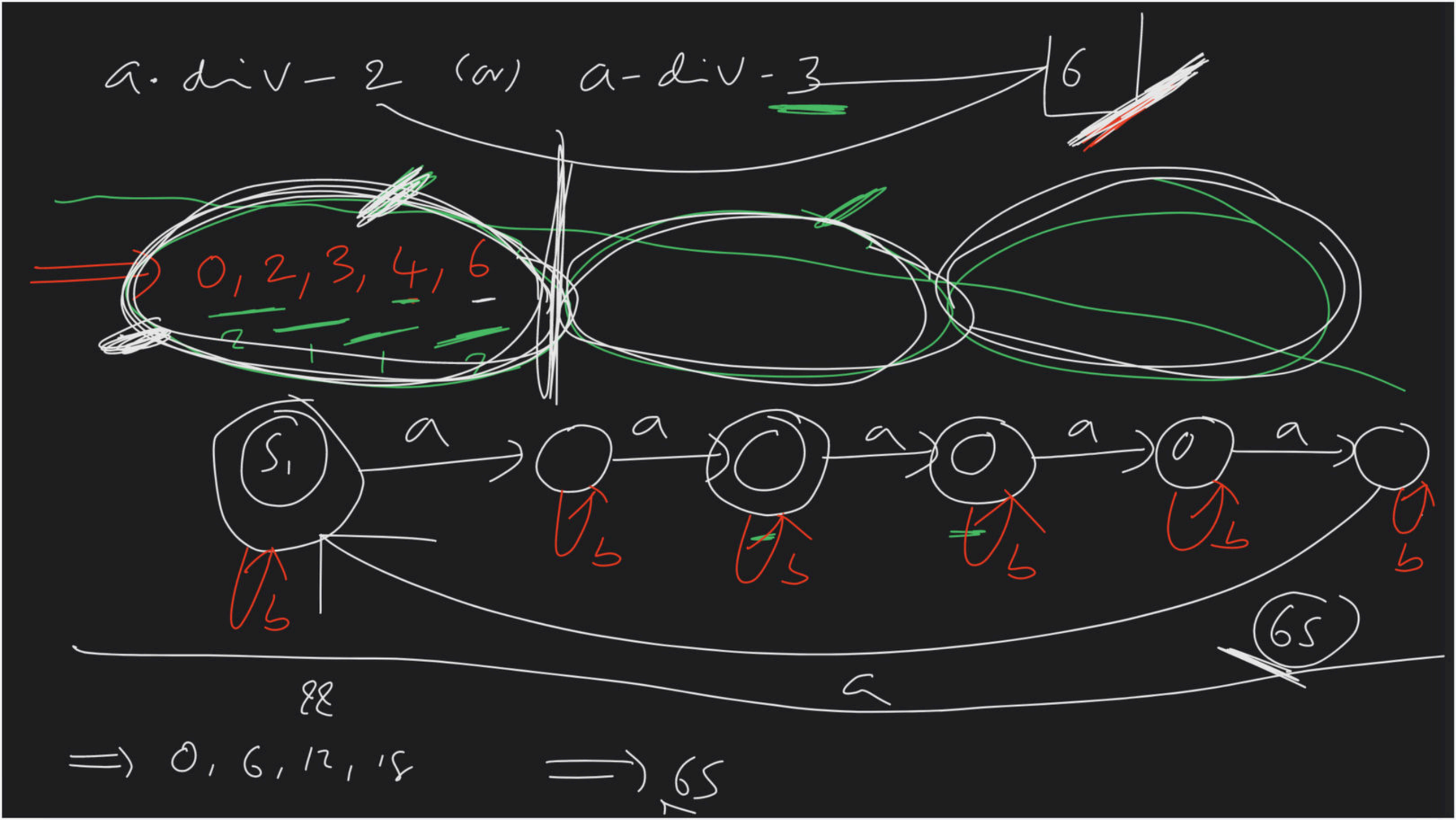
a-div-4 && a-div-2 → 8

⟹ 0, ~~8~~, 4, ~~6~~ 8, 12 16



4

4


a. div - 2 (or) a - div - 3
6
0, 2, 3, 4, 6
2 + + 2
S_1
a
a
a
a
a
b
b
b
b
b
b
65
88
c
$\Rightarrow$ 0, 6, 12, 18
$\Rightarrow$ 65

a-div-3 (or) a-div-7 ⟶ 21

⟹ 0, 3, 6, 7, 9, 12, 14, 15, 18, 21 | 24 | 27 | 28

1 3 1 3

3 3 2 2 3 3 3 1

21-steps

&& ⟹ 21

⟹ 0, 21, 42, 63, ----

⟹ 21

Thanks

Dedicated Help

3-5