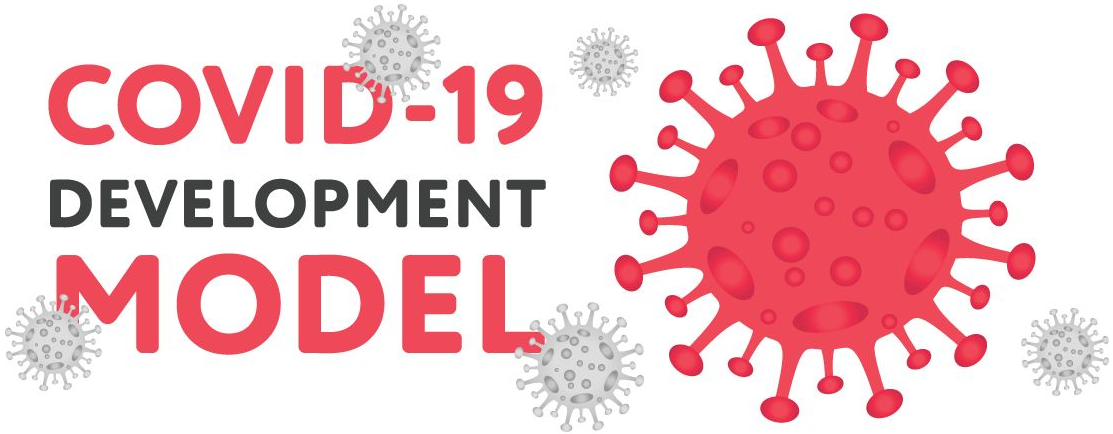
COVID-19 DEVELOPMENT MODEL



- **PREPARED BY:**

DEVELOPERS:

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MENTORS:

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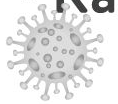
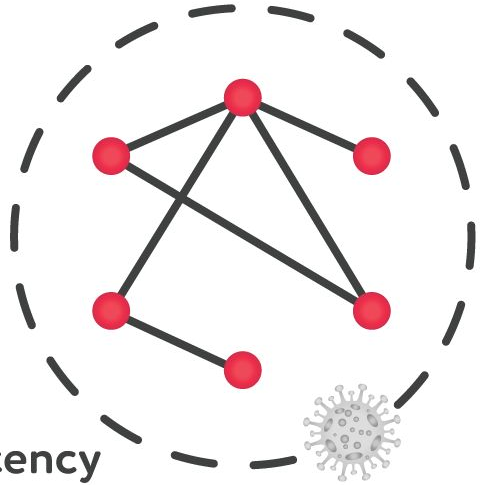
- TYPES OF MODELS OF EPIDEMIC EXPANSION

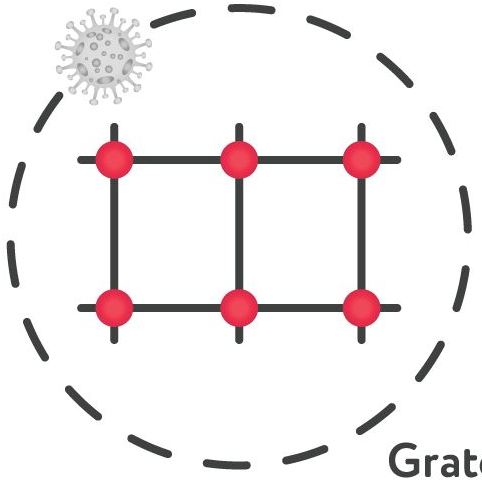
- Scale-Free Network
- Close World Network
- Random Network



- KINDS OF MODEL IMPLEMENTATION

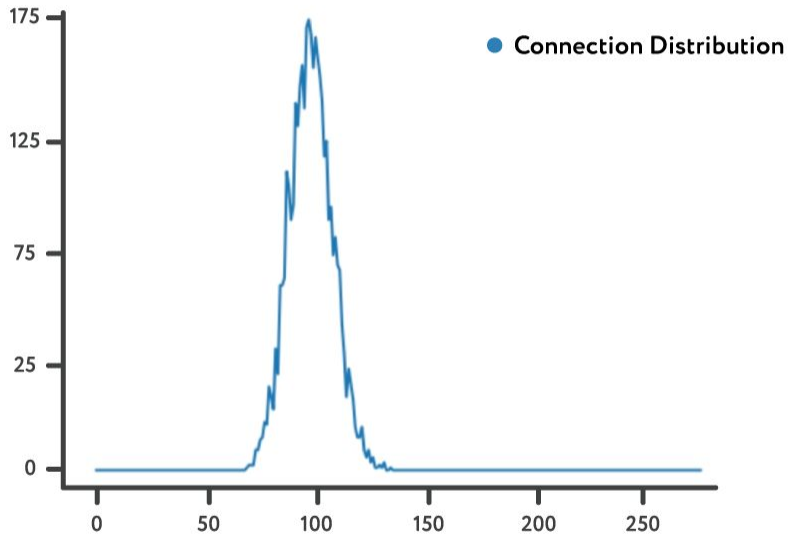


Adjacency Matrix



Grate

- **CONNECTION DISTRIBUTION**



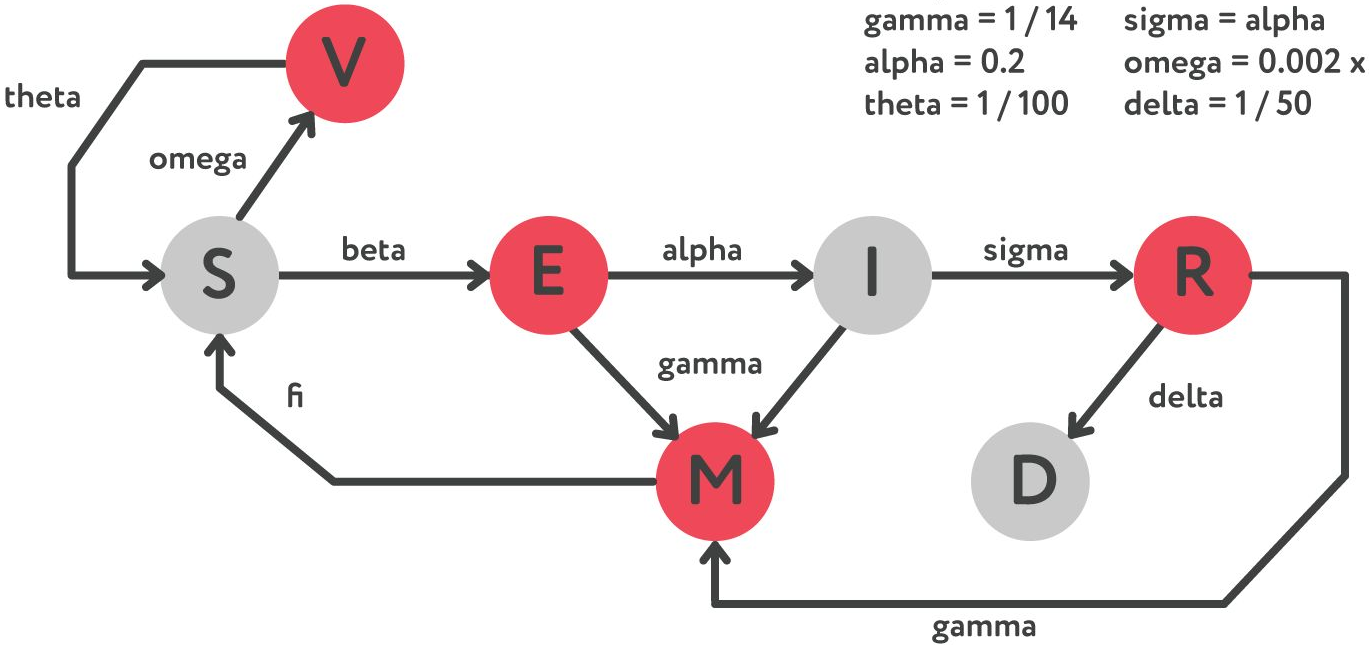
People Number: 4096

Probability Connect: 100 / 4096 = 0.025

- WHAT IS SEIRVDM?

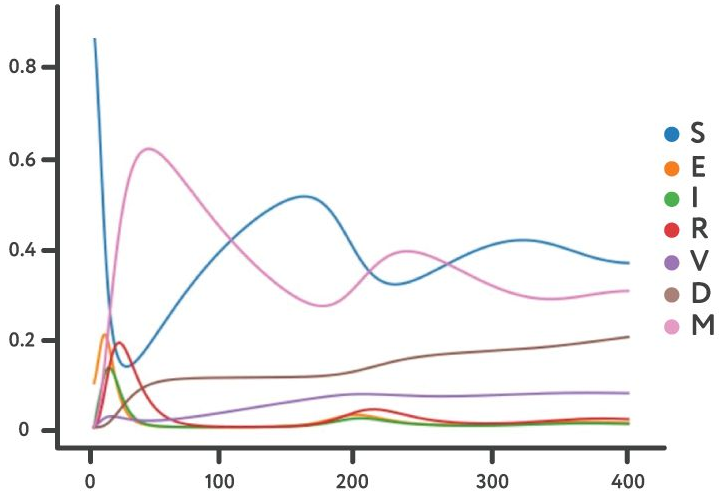
fi = 1 / 120
gamma = 1 / 14
alpha = 0.2
theta = 1 / 100

beta = 0.4
sigma = alpha
omega = 0.002 x 0.9
delta = 1 / 50

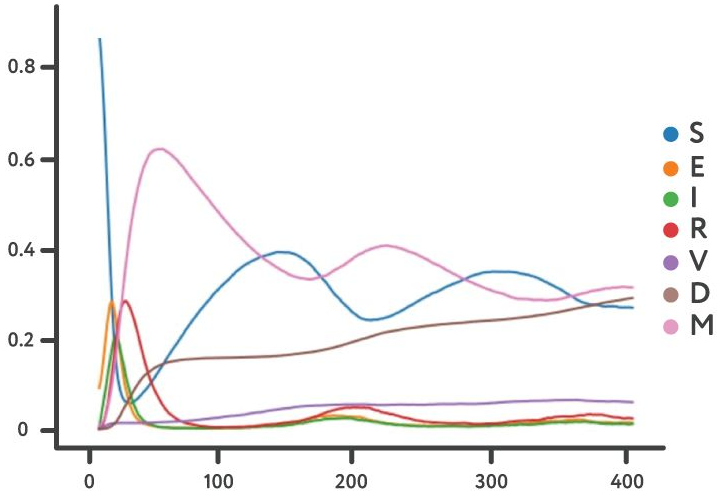


- **SEIRVDM RESULTS**

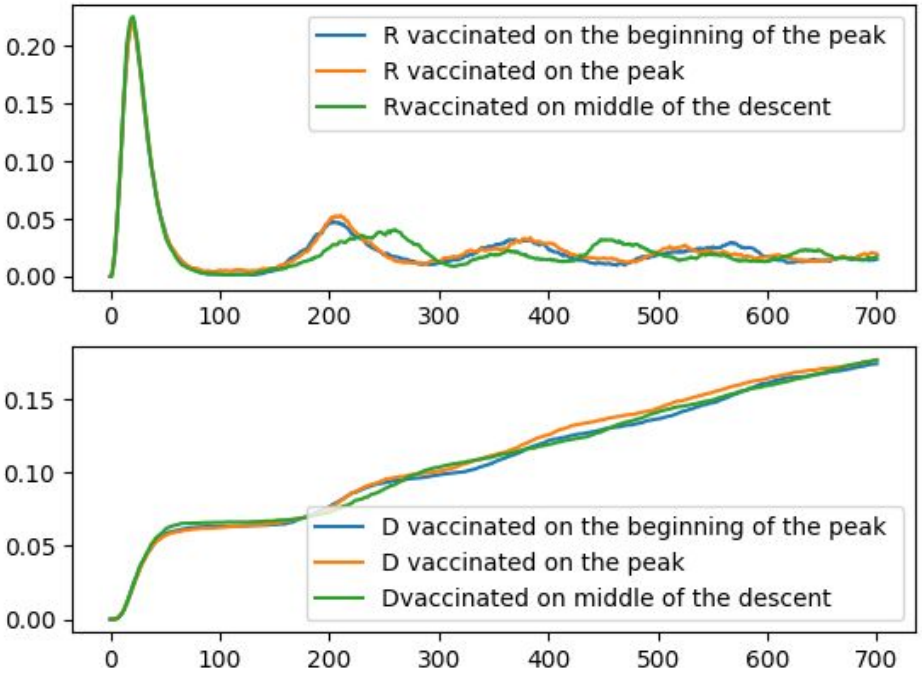
On Differential Equations



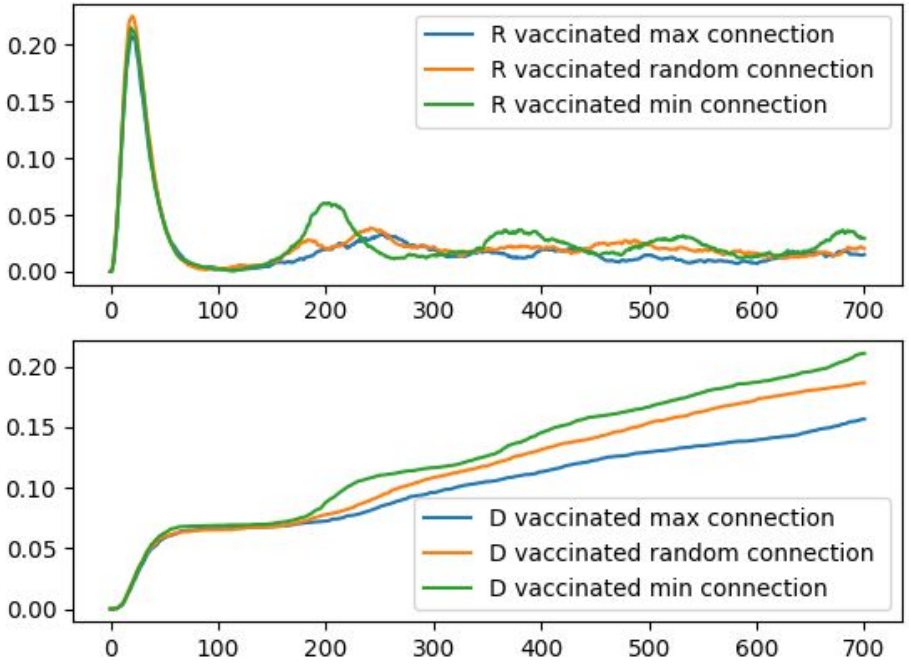
On Random Network



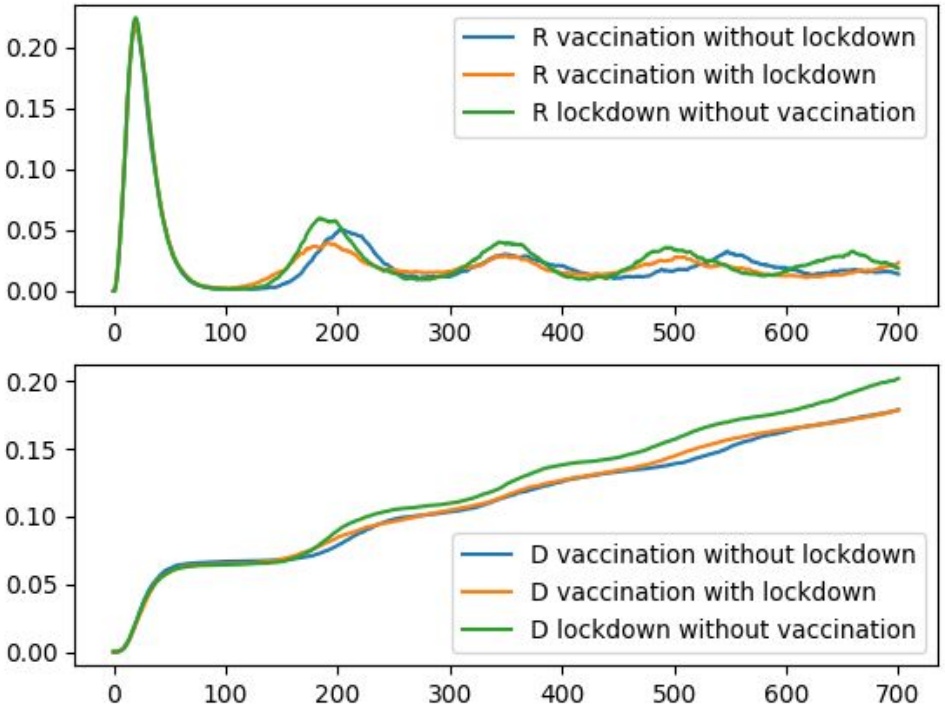
- WHEN TO VACCINATE



- **WHOM** TO VACCINATE

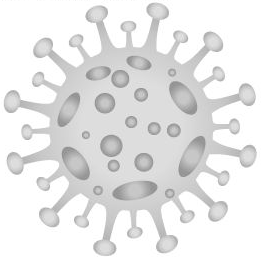


- IMPACT OF LOCKDOWN AND VACCINATION

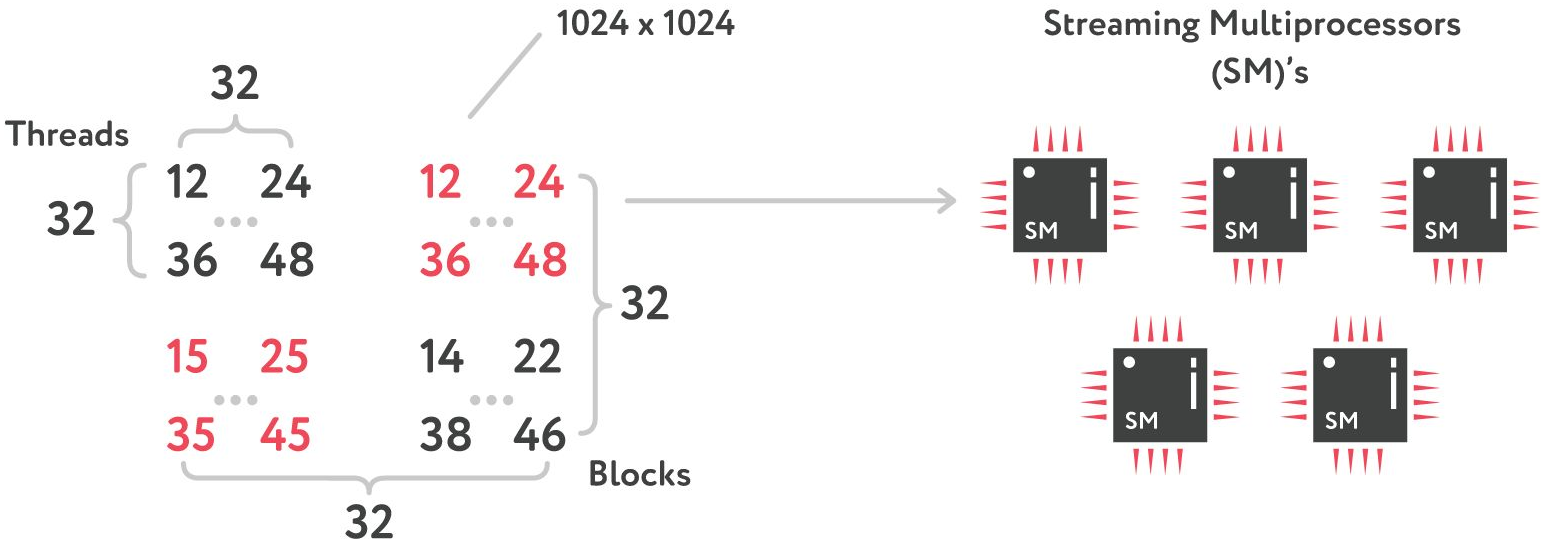


- **FUTURE PLANS**

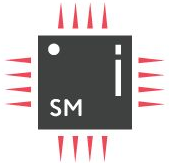
  - Try out other networks.
  - Build and examine more graphs.
  - Make some conclusions and write the notes for our Scientific Article.
  - Accelerate even more the CUDA program.



- WHY CUDA?


1024 x 1024
32
Threads
32
12 24
36 48
12 24
36 48
15 25
35 45
14 22
38 46
32
Blocks
32
Streaming Multiprocessors
(SM)'s
SM
SM
SM
SM
SM

• GOING PARALLEL



1 Block (32 x 32 Threads)

Instruction Executing Cycle on SM:

Step 1: 0-7 Threads execute instruction 1
Step 2: 8-15 Threads execute instruction 1
Step 3: 16-23 Threads execute instruction 1
Step 4: 24-31 Threads execute instruction 1

} 1 Wrap = 32 Threads

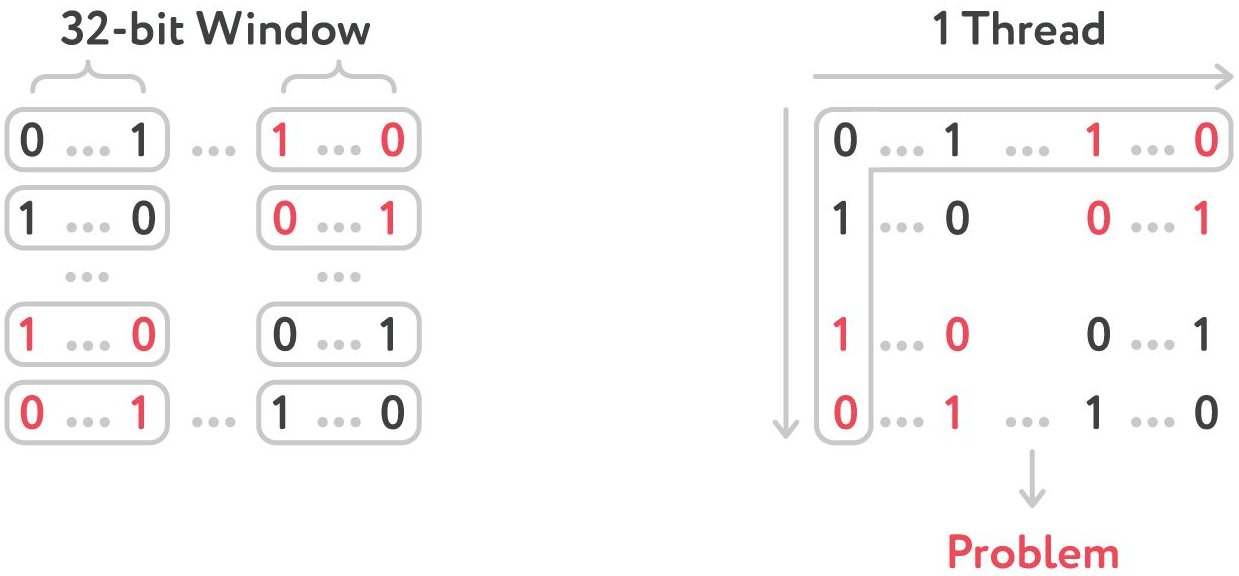
Using Advantages of NVIDIA:

4 Wraps x 2 Instructions x 32 Threads = 256 Thread Instructions at 1 Cycle

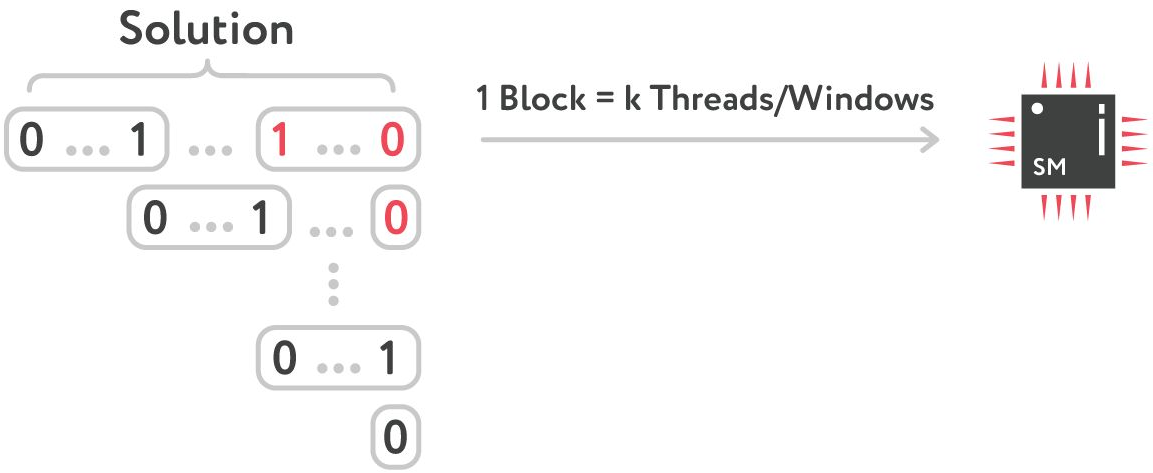
↓

5 SMs x 256 Thread Instructions = 1280 Instructions per Cycle

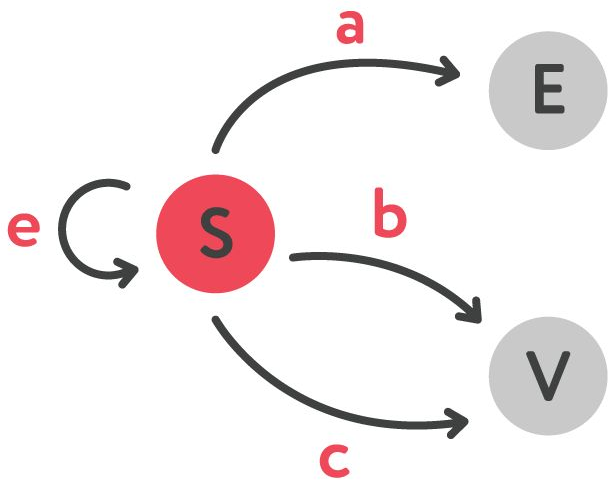
- MEMORY USAGE OPTIMIZATION



- MAKE IT GO PARALLEL



- FINAL STATE MACHINE APPROACH

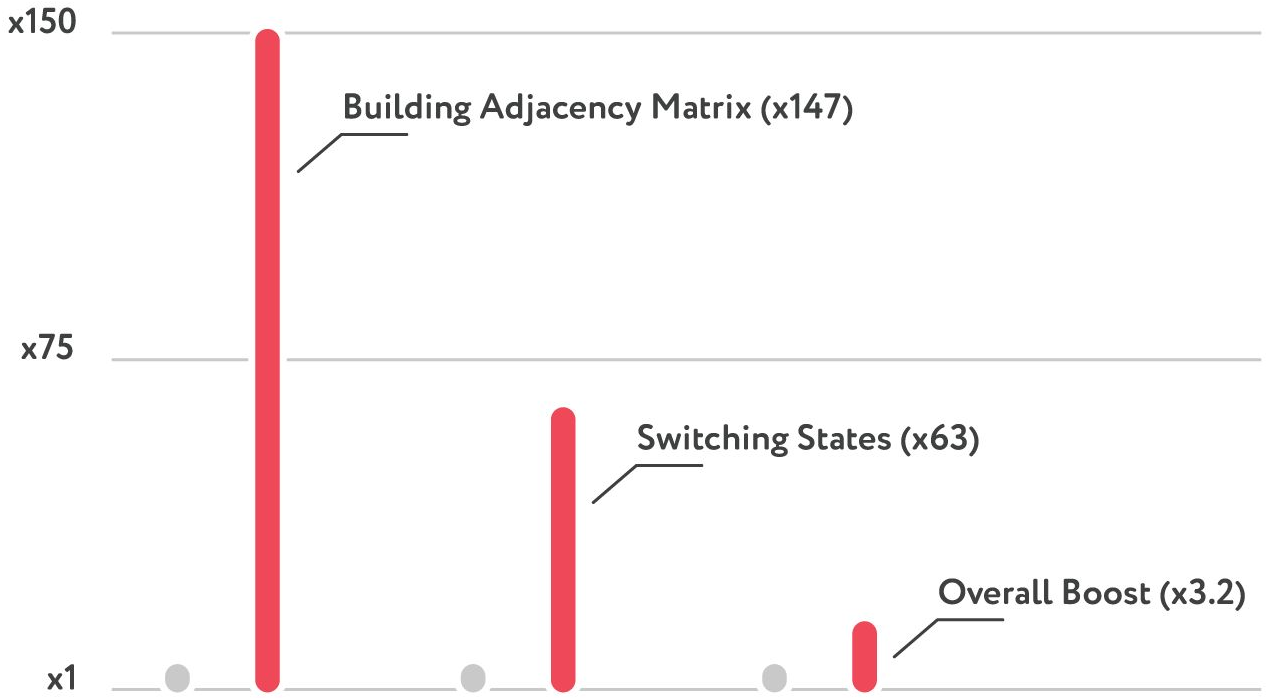


Current	Next	Encoding
S	S	000
	E	001
	V	01X
	V	1XX

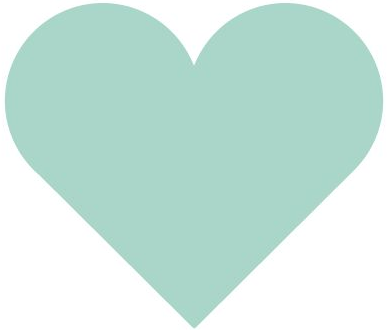
$$next_state_enc = c_3\ b_2\ a_1$$

$$next_state = ceil(\log_2(next_state_enc + 1))$$

• CUDA BENCHMARKS



Thank You for Your Attention!



Don't forget to check it out! ⟶