Bucharest University of Economic Studies
Cybernetics, Statistics and Economic Informatics

# Developing a Fully Homomorphic Encryption WebAssembly module


**GRADUATE**
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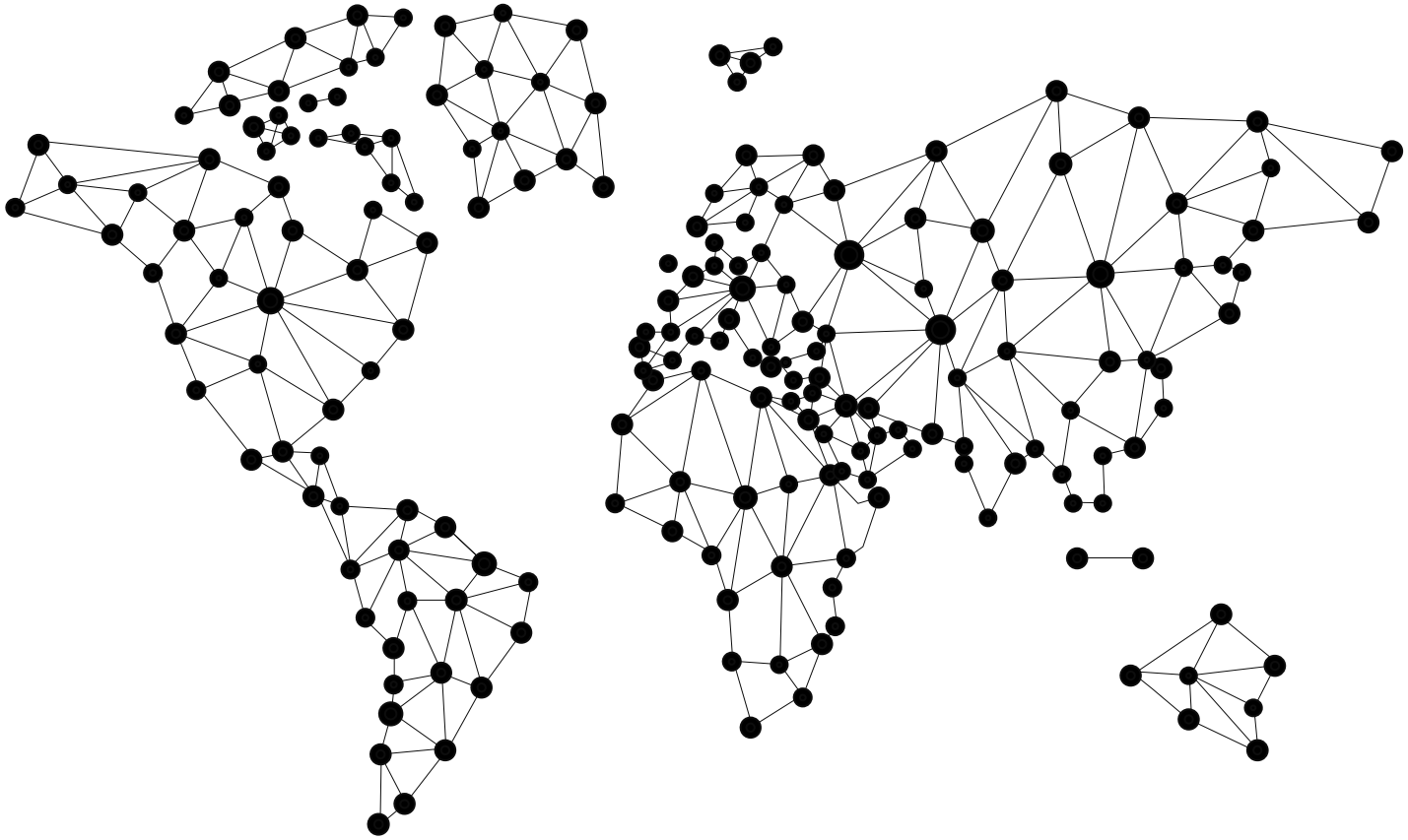
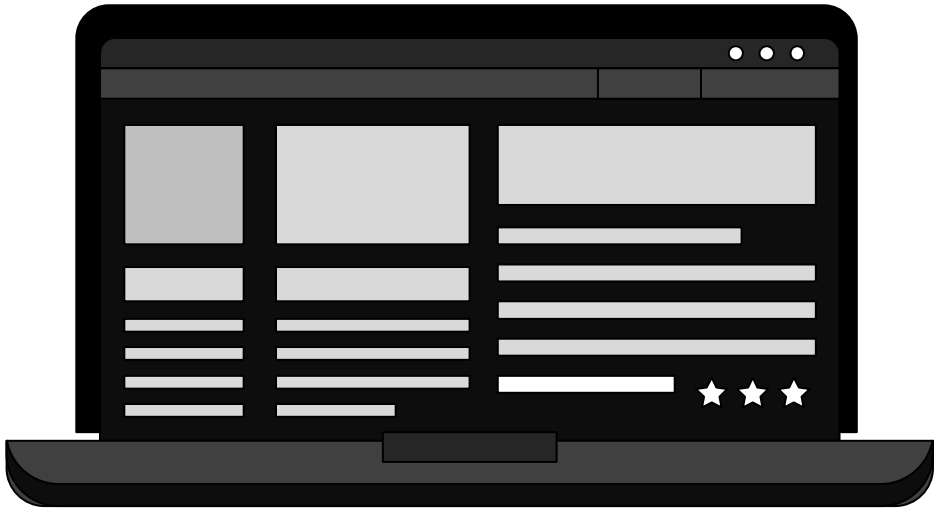
**LECTURER PH.D. ANDREI TOMA**

# OBJECTIVE

**Creating a library that could be easily used on the web, while making fully homomorphic encryption concepts more accessible.**



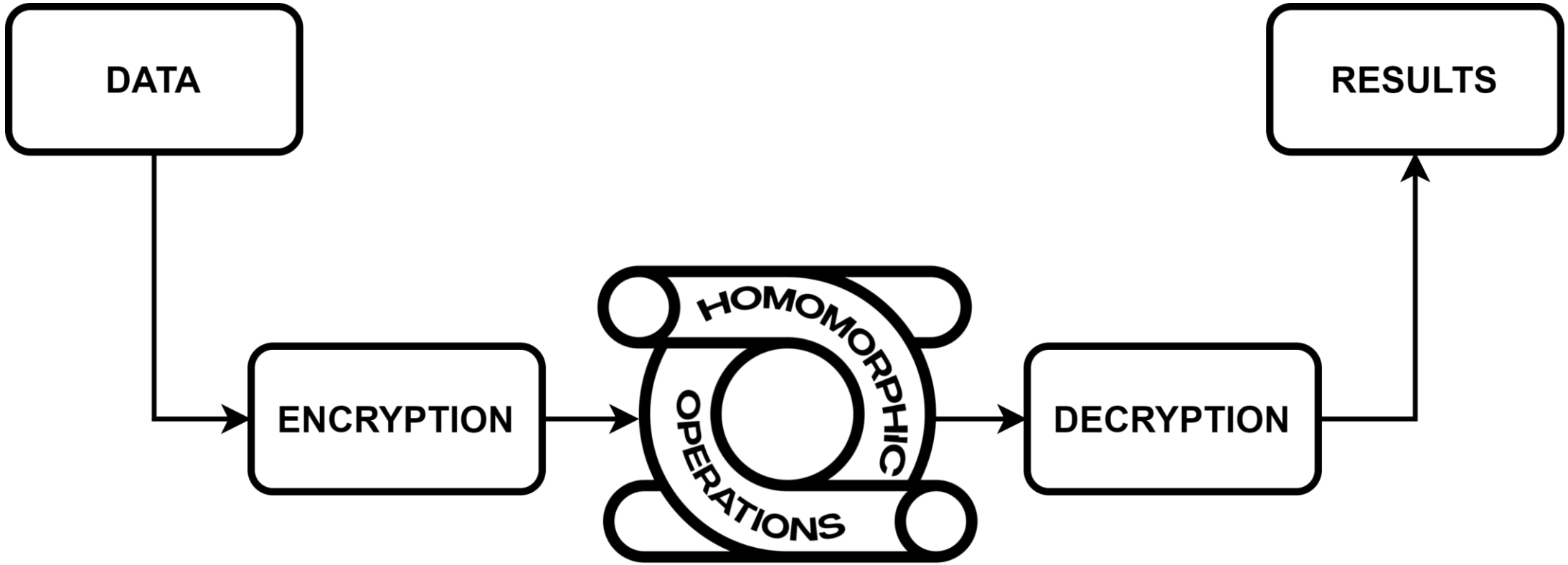
# SUMMARY



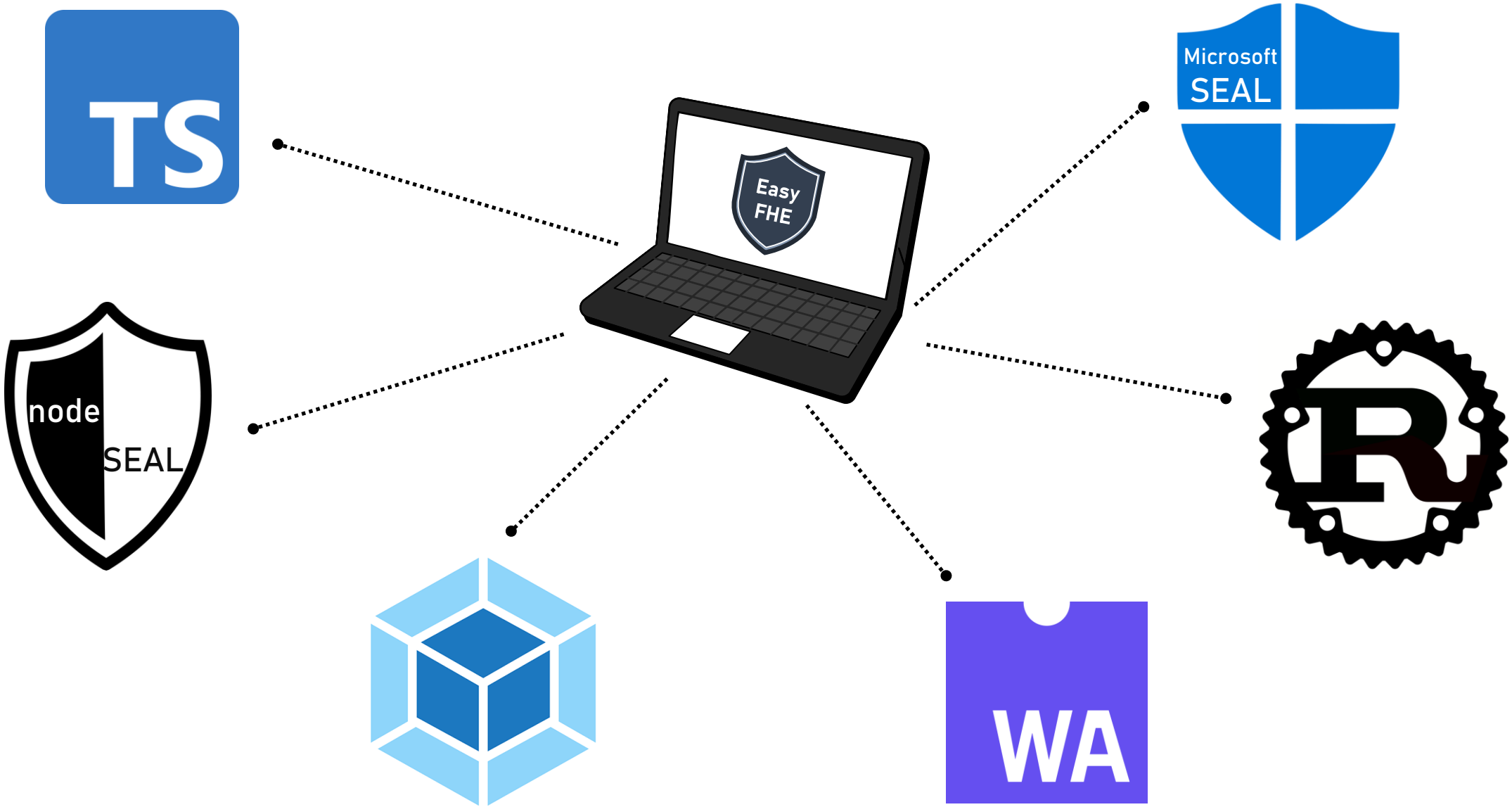
# INTRODUCTION

**Every day, we create roughly 2.5 million terabytes. Around 9% is private information, meaning 225000 terabytes. The processing cost is immense.**
***Imagine if was something that could safely process all this data…***

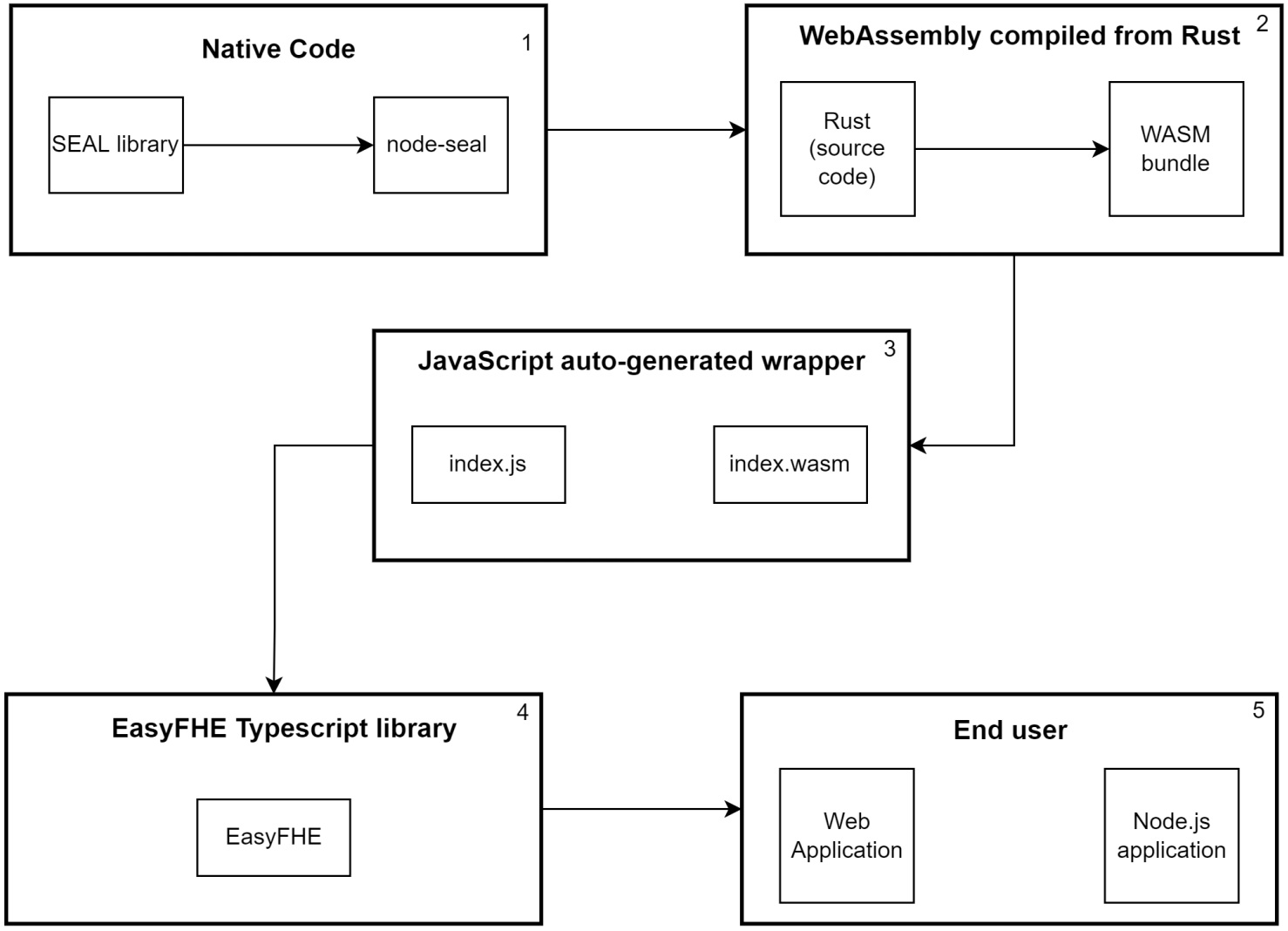
# INTRODUCTION



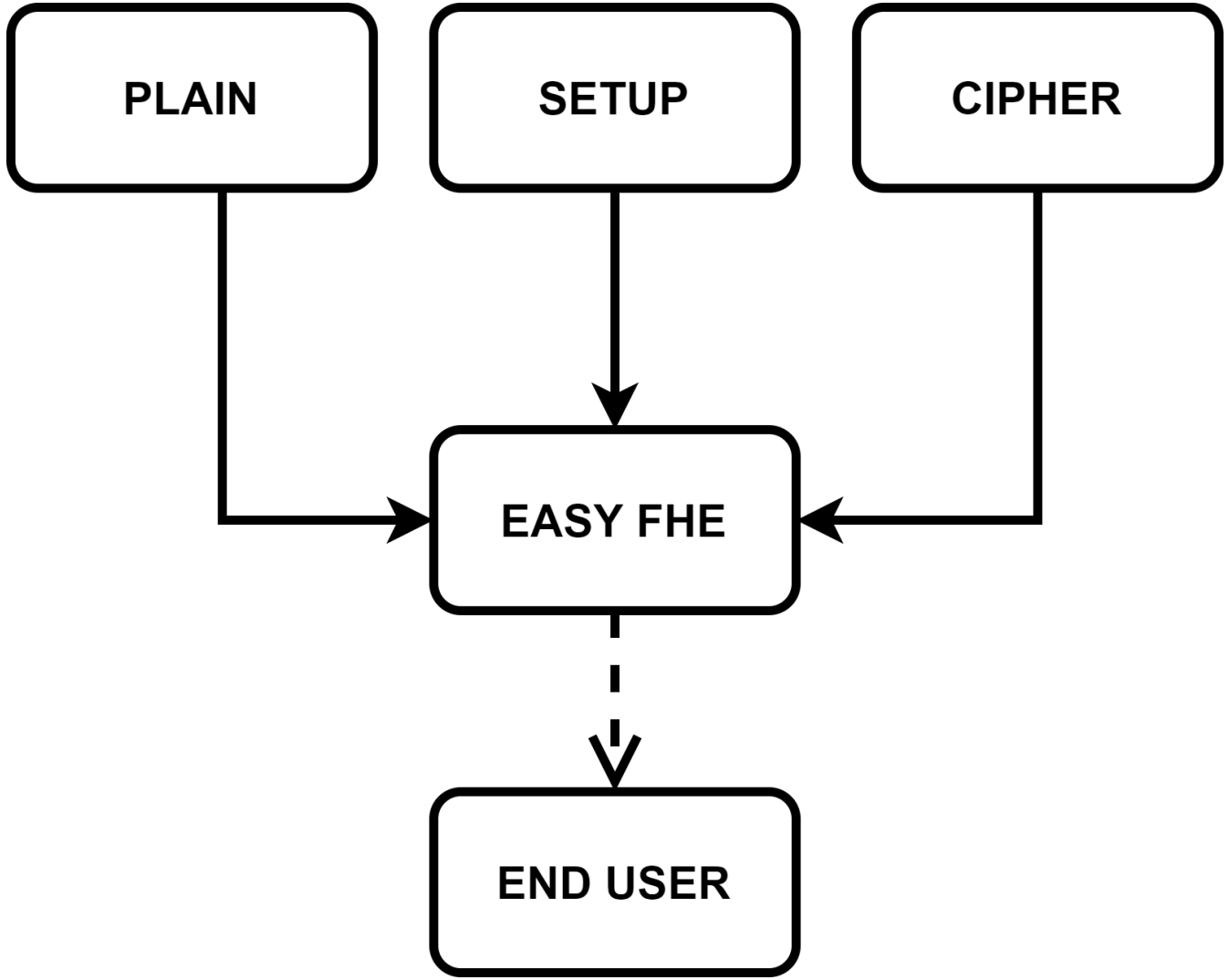
# USED TECHNOLOGIES



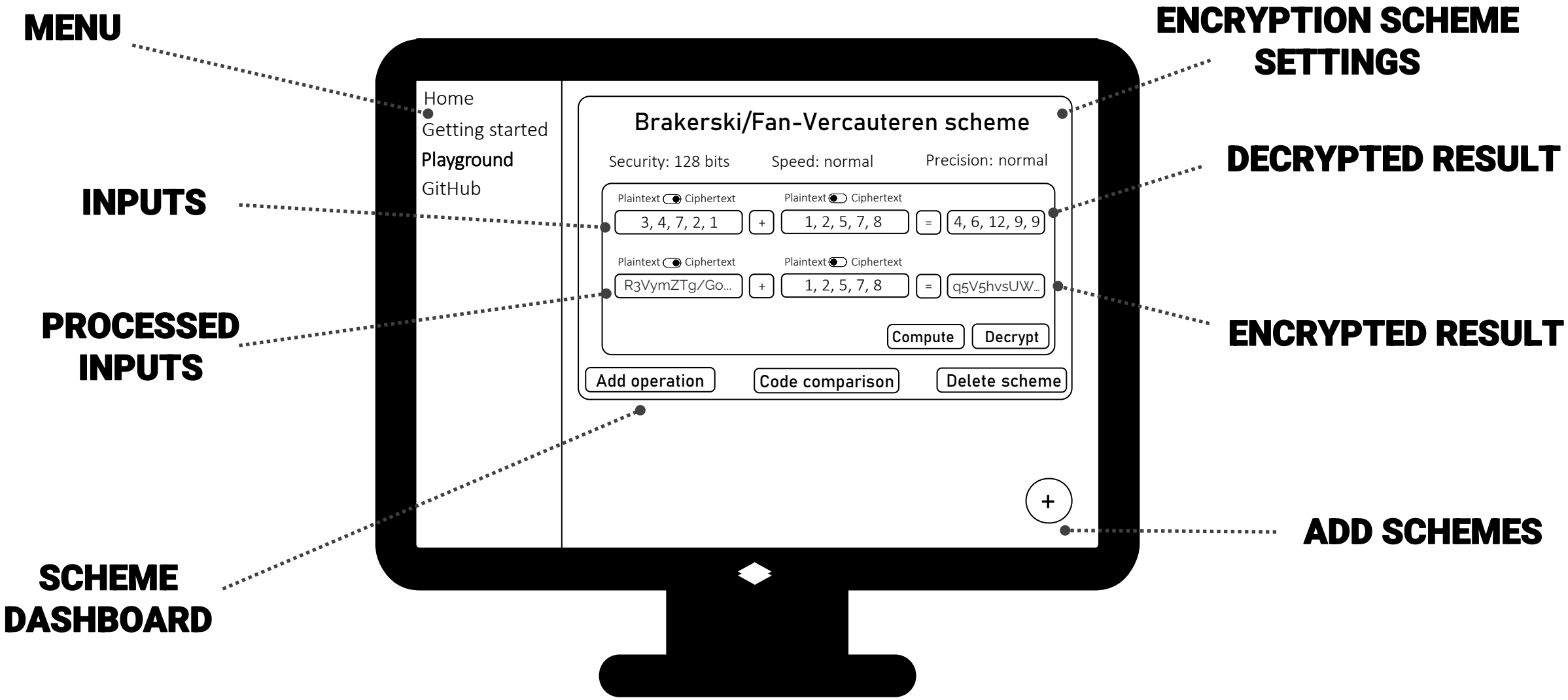
# ARCHITECTURE



# ARCHITECTURE

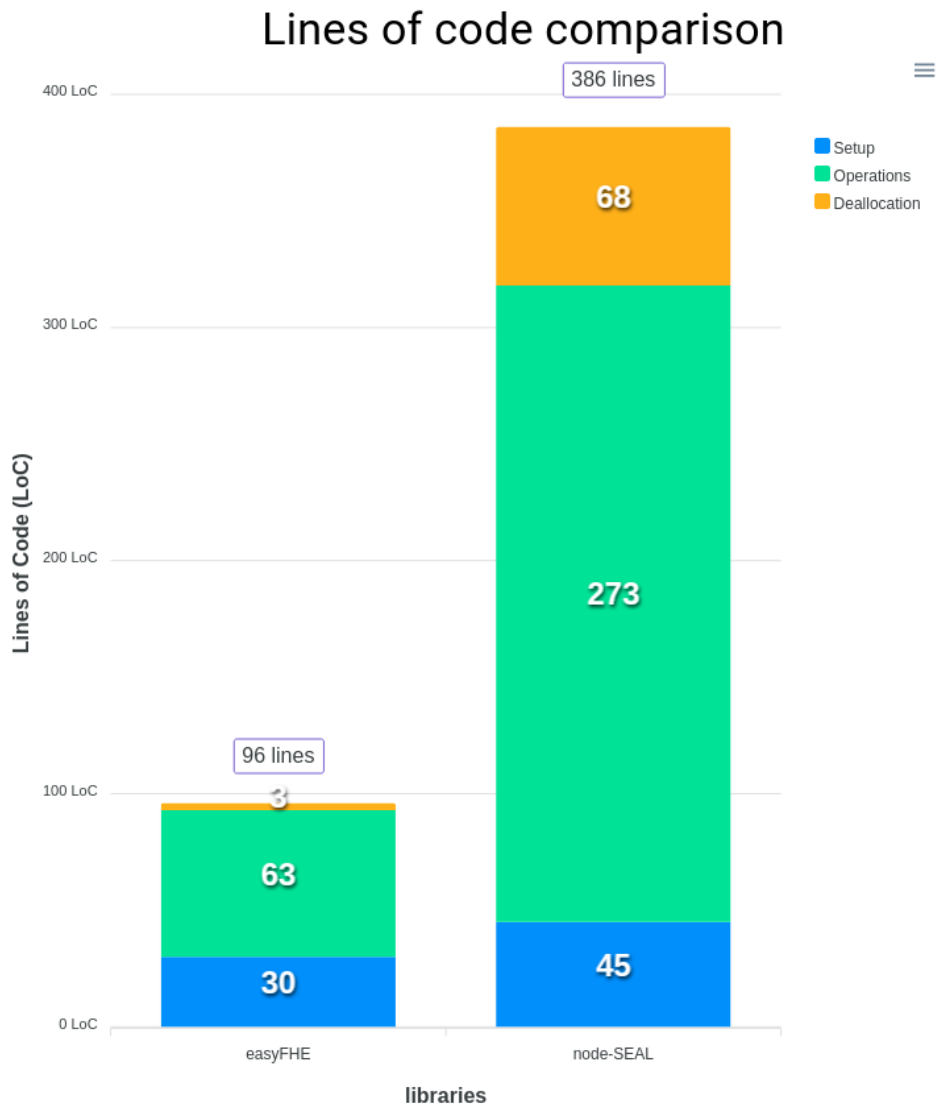


# DEMO


MENU
INPUTS
PROCESSED INPUTS
SCHEME DASHBOARD
ENCRYPTION SCHEME SETTINGS
DECRYPTED RESULT
ENCRYPTED RESULT
ADD SCHEMES
Home
Getting started
Playground
GitHub
Brakerski/Fan-Vercauteren scheme
Security: 128 bits
Speed: normal
Precision: normal
Plaintext Ciphertext
3, 4, 7, 2, 1
+
Plaintext Ciphertext
1, 2, 5, 7, 8
=
4, 6, 12, 9, 9
Plaintext Ciphertext
R3VymZTg/Go...
+
Plaintext Ciphertext
1, 2, 5, 7, 8
=
q5V5hvsUW...
Compute
Decrypt
Add operation
Code comparison
Delete scheme
+

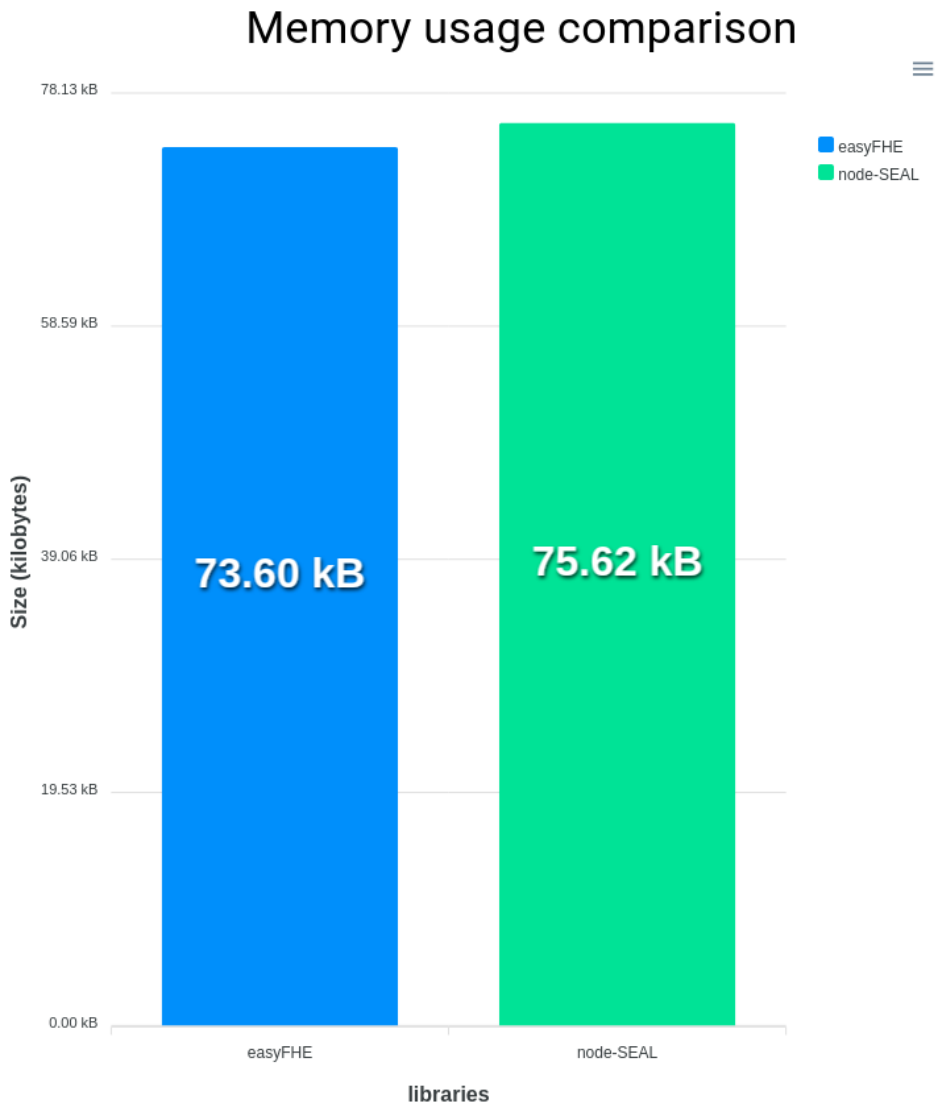
# RESULTS

**From a developer's perspective, source code written using EasyFHE is on average 24.87% from the node-SEAL equivalent or almost 4 times more compact.**



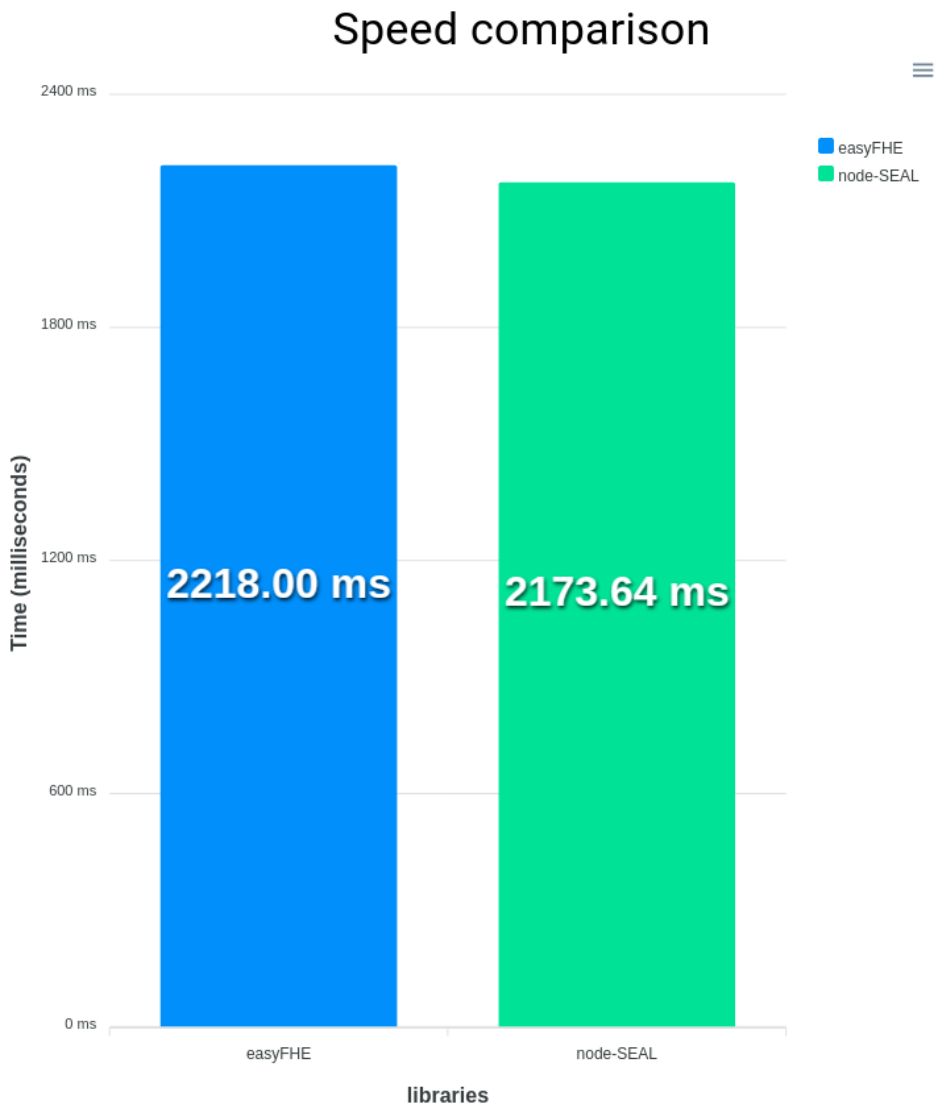
# RESULTS

**EasyFHE module uses on average with 2.67% less RAM memory due to applied optimizations.**

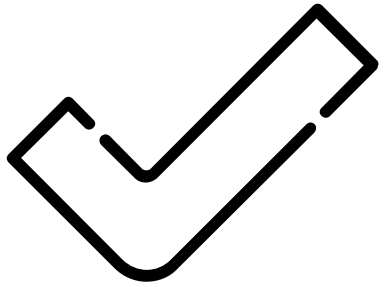


# RESULTS

**EasyFHE is on average with 2.04% slower than the node-SEAL counterpart.**



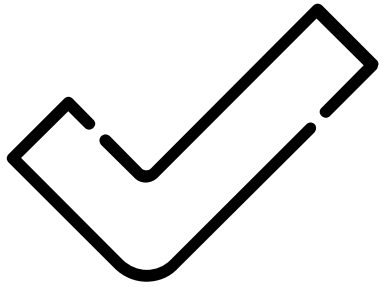
# CONCLUSIONS



## It is developer friendly.

**EasyFHE offers a compressed alternative, with simplified  and safe APIs implemented in Typescript.**

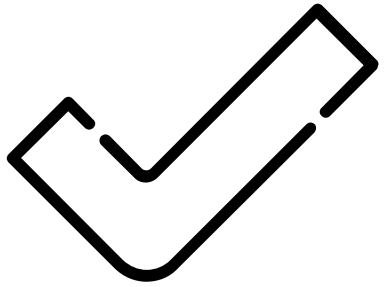
# CONCLUSIONS



## It is Plug & Play.

**EasyFHE it is designed with interoperability in mind, being compatible with websites and Node.js applications.**

# CONCLUSIONS



## It is efficient.

**It uses the resources intelligently, offering a reduced memory footprint.**

# Q&A

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