INTRODUCTION TO

How java Works?

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Advanced programming Course lectured by Dr. Fazli | 2024 | Sharif University of Technology

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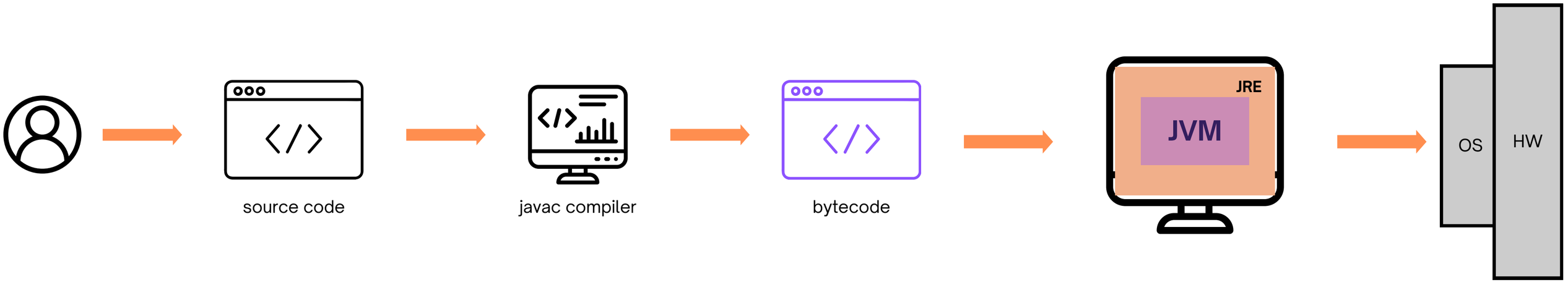
- Garbage Collection: Keeping Java Memory Tidy

The Journey of a Java Program



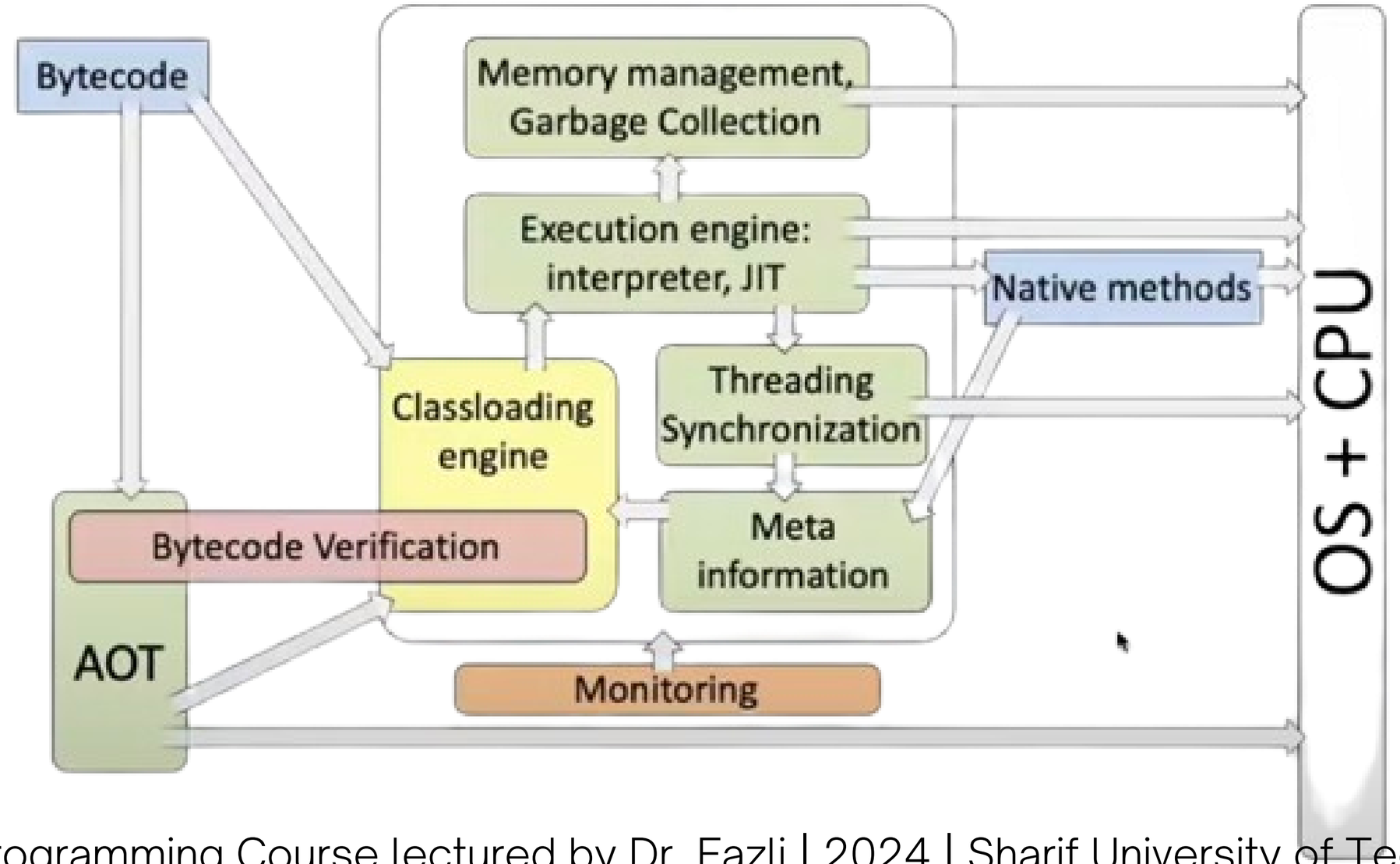
What is Compiler?

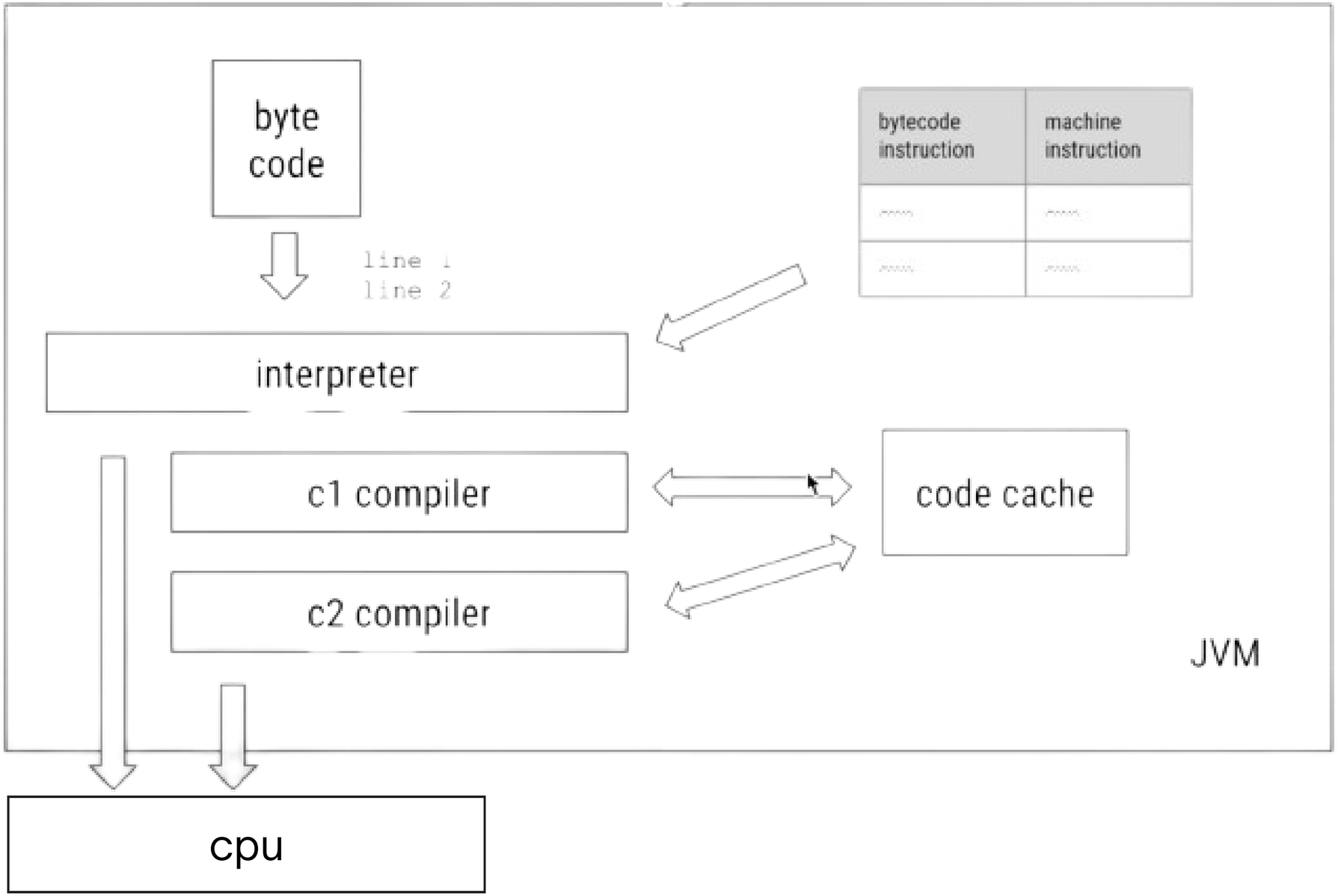
- A compiler is a software tool that translates high-level programming language code into machine-readable code.

What is javac?

- **javac** is the standard Java compiler provided by the Java Development Kit (JDK). It compiles Java source code files into bytecode files that can be executed by the Java Virtual Machine (JVM).

JVM Anatomy


Bytecode
Memory management, Garbage Collection
Execution engine: interpreter, JIT
Native methods
Classloading engine
Threading Synchronization
Bytecode Verification
Meta information
AOT
Monitoring
OS + CPU


byte code
line 1
line 2
bytecode instruction
machine instruction
interpreter
c1 compiler
c2 compiler
code cache
JVM
cpu

What is Interpreter?

- An interpreter is a program that executes instructions directly, translating each instruction into machine code as it runs.

What is JIT?

- **JIT stands for Just-In-Time compilation. It is a technique used by some programming language implementations to improve runtime performance by dynamically compiling bytecode into native machine code during execution.**

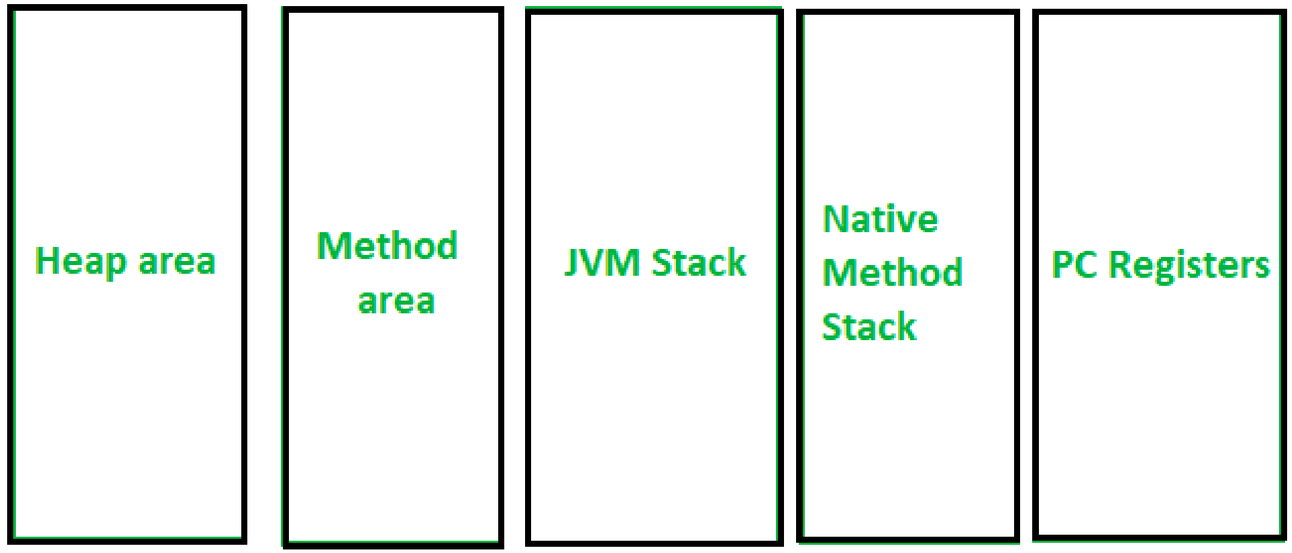
OPTIMIZATION TECHNIQUES

Dead code	Removing code which is not used
Escape analysis	Moving objects created in methods and never returned, to stack instead of the heap
Loops	Combining loops, unrolling loops, loop inversion etc.
Method inlining	Moving bodies of small methods within the calling methods
Lock removal	If only 1 thread ever uses the lock, remove it
Null check elimination	If variable is never null, remove the null check code

Memory management

Who handles memory management, the programmer or Java?

Java handles memory management. Programmers have no control over memory management.



Java Memory Area parts

Garbage Collector

What is the purpose of garbage collection in Java?

- The purpose of garbage collection in Java is to reclaim memory occupied by unreachable objects, thus keeping the memory tidy and preventing memory leaks.

How does garbage collection work in Java?

- Garbage collection in Java involves identifying and reclaiming memory occupied by objects that are no longer reachable, typically through reference counting or tracing algorithms implemented by the garbage collector.

References:

[0]:https://www.youtube.com/watch?v=BeMi8K0AFAc
[1]:https://www.youtube.com/watch?v=sJVenujWGjs
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THANK YOU

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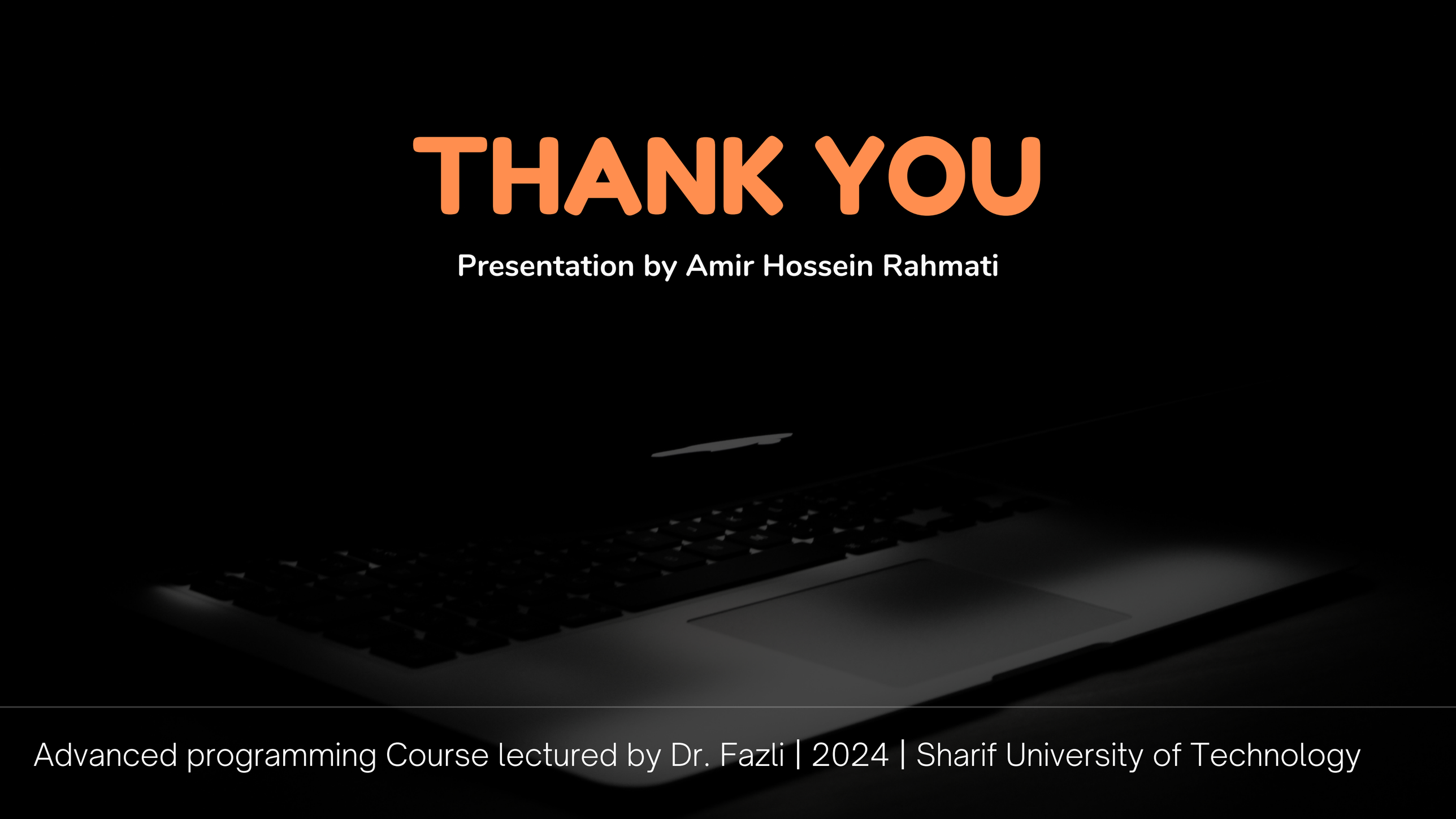

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