Interpretation Vs. Compilation

Computer Science III

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Programming Languages

32-bit (4-byte) `ADD` instruction:

100000	00 100	00010	00011	00000000000
opcode	**rc**	**ra**	**rb**	**(unused)**

Could be something like: `Reg[4] <- Reg[2] + Reg[3]`

In assembly:

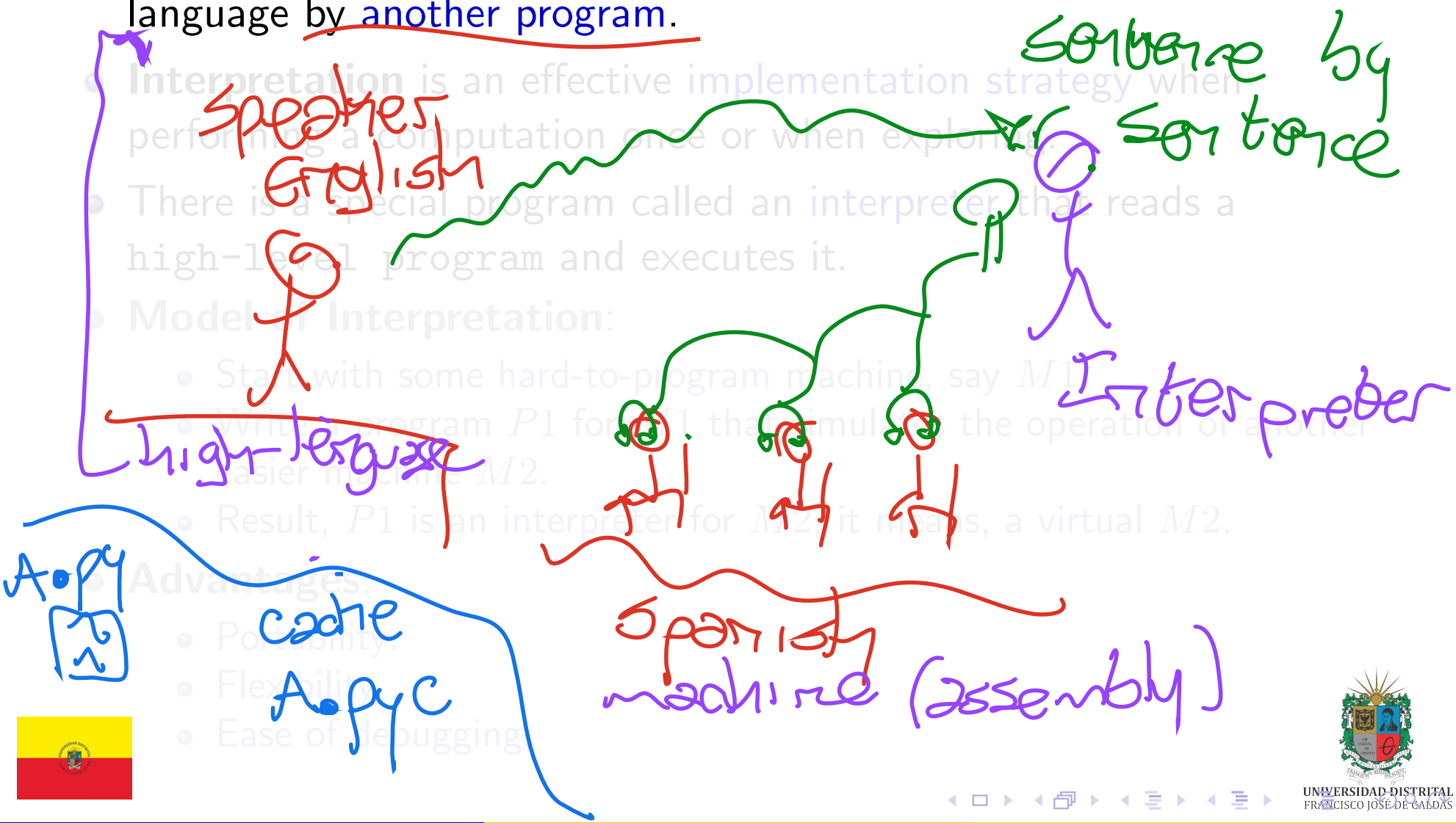
```
1    ADD(R2, R3, R4)
2
```

In any high-level language:

```
1    a = b + c;
2
```

Interpretation

- **Interpretation** is the process of executing a program in a high-level language by another program.



Interpretation

- **Interpretation** is the process of executing a program in a high-level language by another program.
- **Interpretation** is an effective implementation strategy when performing a computation once or when exploring.
- There is a special program called an interpreter that reads a high-level program and executes it.
- **Model of Interpretation**:
  - Start with some hard-to program machine, say $M1$.
  - Write a program $P1$ for $M1$ that simulates the operation of another easier machine $M2$.
  - Result, $P1$ is an interpreter for $M2$, it means, a virtual $M2$.
- **Advantages**:
  - Portability.
  - Flexibility.
  - Ease of debugging.

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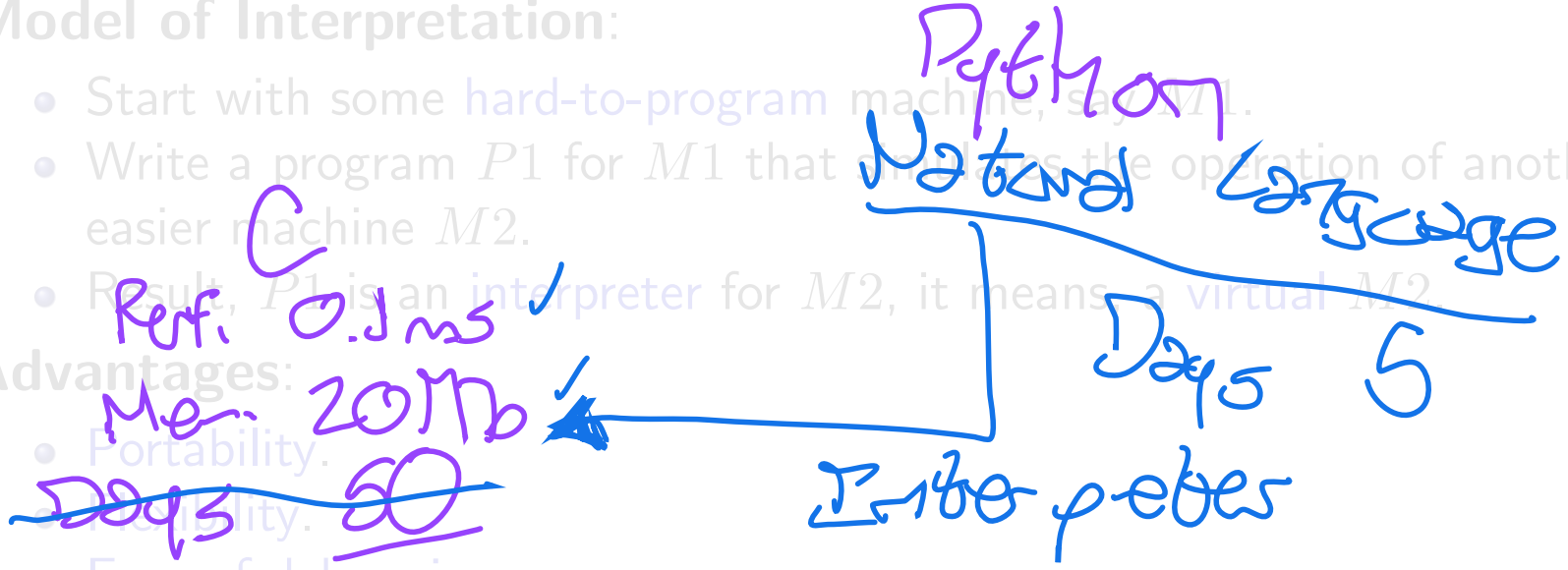

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  - Fast Execution.
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C → Assembly → Machine

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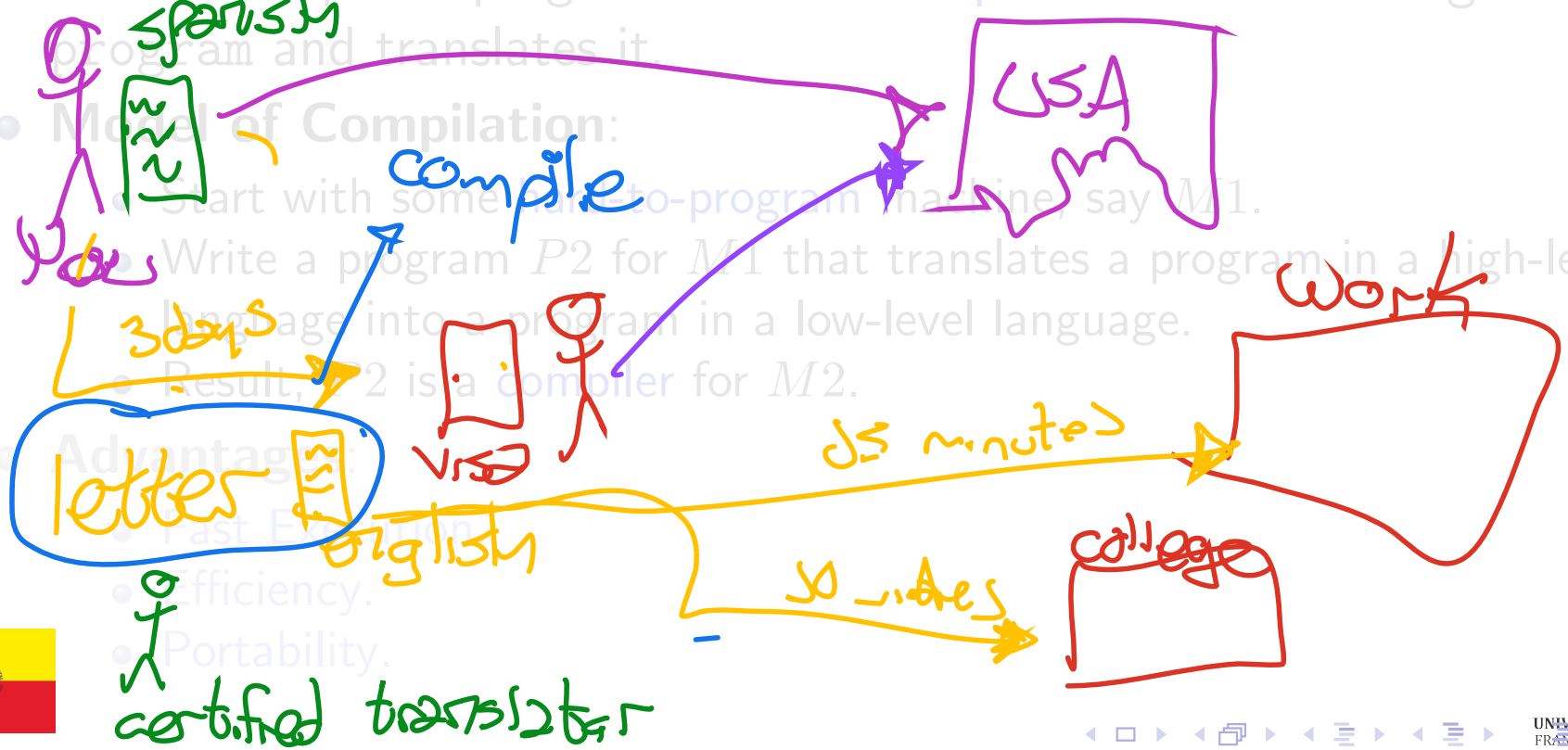

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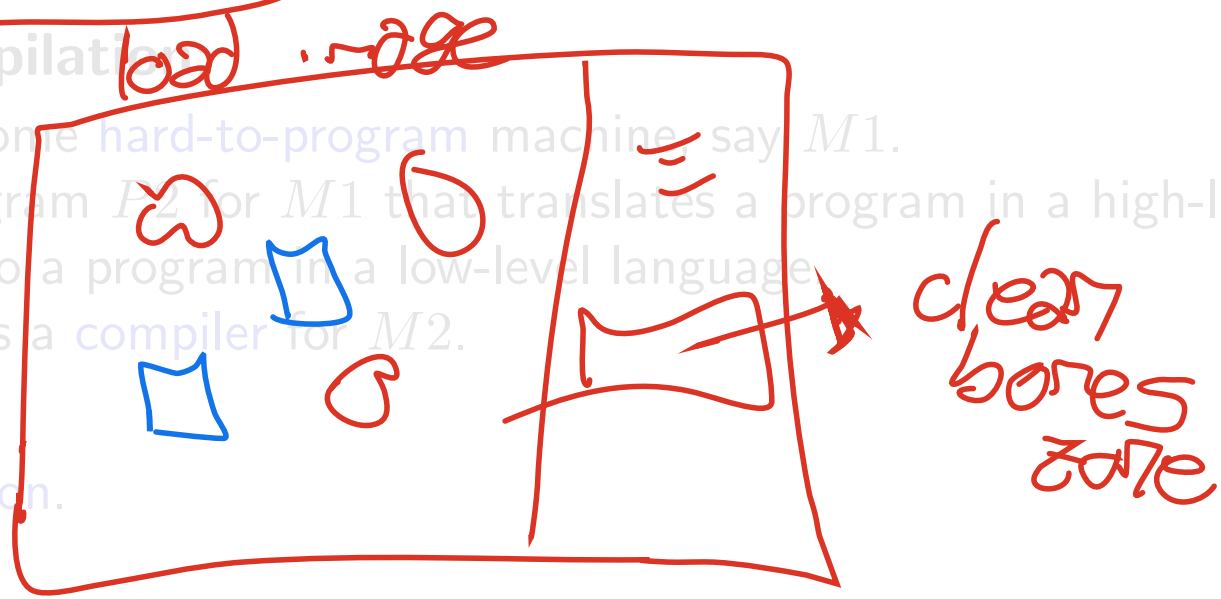

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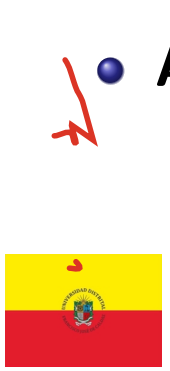

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Interpretation Vs. Compilation

Characteristics differences:

	Compilation	**Interpretation**
How does it treat input `x + 2`?	Generate a program that computes `x + 2`	Computes `x + 2`
When it happens?	Before Execution	During Execution
What it complicates/slows?	Program Development	Program Execution
Decisions made at	Compile Time	Run Time

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Thanks!

Questions?

Repo: *https://github.com/EngAndres/ud-public/tree/main/courses/computer-science-iii*

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