**Program Compilation**

- **Program**: Code written in a high-level programming language.
- **Source Code**: Human-readable code.
- **Intermediate Code**: Machine-executable code.
- **Object Code**: Code that can be executed by a computer.
- **Binary Code**: Executable file.
- **Execution Environments**: Operating Systems and Hardware.

**My Idea!**

1. **Pre-compiled Libraries (for Operating System)**
2. **Pre-compiled Libraries (Game Engine)**
3. **Compiler**: A program that converts source code into intermediate code.
4. **Linker or Loader**: A program that converts intermediate code into object code.
5. **Our Running Application**: The executable file that runs on hardware.

**Cost of Apples**

- **Cost of Apples separately**: $7.68
- **Cost per box**: $7.25
- **Apples per box**: 24

**Computers are programmed in code**

- Each language category allows the programmer to express solutions to problems in a natural way.
- "Human Readable" programs need to be in a form the computer can use.

**Compilation**

- Programs are translated directly into machine language.

**Interpretation**

- Programs are interpreted and operations are performed by another program known as an interpreter.

**Hybrid Implementation Systems**

- A compromise between compilers and pure interpreters.

**Language Translation**

- **Computers are programmed in code**
- **Compilation**: Programs are translated directly into machine language.
- **Interpretation**: Programs are interpreted and operations are performed by another program known as an interpreter.
- **Hybrid Implementation Systems**: A compromise between compilers and pure interpreters.
Language Translation

Program Interpretation

- Program execution is slow. Modifications only require recompiling the source code and are reflected immediately in execution.

Hardware Pairing

- Abstract Machine
- Program Interpretation
- Just-In-Time (JIT) Compilation
- Execution Environments

JIT systems are delayed compilers. Java and .NET programs are compiled programs. JIT systems are widely used for interpreted programs with greater execution speed of compiled programs.

Racket

- Editor Tool: Text
- Source Code
- Text

Java Byte Code

- Java Virtual Machine
- Java Byte Code

Program execution is slow. Modifications only require recompiling the source code and are reflected immediately in execution.

Execution Environments

- Just-In-Time (JIT) Compilation
- Provides the portability of interpreted programs with greater execution speed of compiled programs.

Execution Environments

- Machine code version is kept for subsequent calls
- JIT systems are widely used for Java and .NET programs
- JIT systems are delayed compilers

My Idea!

- My Idea!

Language Translation Paradigms

- Going from Human Readable to Machine Executable
- Provides the portability of interpreted programs with greater execution speed of compiled programs.