Comparison of compiler and interpreter

**Compiler/Interpreter** is a tool that translates code into something the computer can understand.

* **Compiled Languages:** The entire code is converted into machine code before running.  
  Examples: C, C++, Rust.
* **Interpreted Languages:** Code is executed line-by-line during runtime.  
  Examples: Python, JavaScript.
* **Hybrid (Compiled + Interpreted):** First compiled into an intermediate format, then interpreted at runtime.  
  Examples: C#, Java.
* **Compiled vs. Interpreted Languages**

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| **Feature** | **Compiled Languages** | **Interpreted Languages** |
| **Execution Speed** | Faster (pre-compiled) | Slower (line-by-line) |
| Compilation | Required (before running) | Not required (runs directly) |
| **Error Detection** | Errors detected before running | Errors detected during runtime |
| Portability | Less portable (compiled for specific OS/CPU) | More portable (runs on any system with interpreter) |
| **Debugging** | Harder (requires recompilation) | Easier (debug in real-time) |