Project Name : Build a Virtual CPU emulator

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Objectives : The scope of a virtual CPU emulator includes:

1. Software Development & Testing: Allows for application testing on various CPU architectures without physical hardware.

2. Education & Research: Supports learning about CPU design, instruction sets, and systems programming in a controlled environment.

3. Security: Facilitates safe malware and vulnerability analysis in isolation from physical hardware.

4. Compatibility: Allows cross-platform software compatibility by emulating different CPU architectures.

Resource needed to build a virtual CPU emulator including CPU Architecture Documentation,Memory Management, Debugger and profiling Tools,Testing Software,Binary Translators.

To set up a development environment for a virtual CPU emulator Install Compilar,Use an IDE like Visual Studio Code,CLion,set up GDB for c/c++ or LLDB for Rust,Testing Framework for intregrate Google Test tools.

Features of a virtual CPU:

1.Instruction Emulation: Executes specific CPU instructions.

2.Memory Simulation: Executes RAM and registers.

3.Representation: Represents about half of a physical CPU’s processing ability or one CPU thread.

4.I/O simulation: Handles virtual input/output.

5.Performance Monitoring: Tracks CPU cycles and memory access.

We can choose c++ programming language for developing a virtual CPU emulator and we can choose tools those are commonly used in c++ those are- Compiler,IDE,Debugger,Binary Translator,version control.

Setup version control using Github:

# set up a Github Repository

1. Log in to GitHub (or create an account if you don’t have one).

2. Create a new repository:

*Give it a name (virtual-cpu-emulator).

*Choose visibility: Public or Private.

# Link Your Local Repository to GitHub

1. Add the GitHub repository as a remote:
   git remote add origin https://github.com/yourusername/virtual-cpu-emulator.git

2. Push local changes to GitHub:

```
git branch -M main

git push -u origin main
```

# Clone the Repository Locally

Once the repository is created,it will see the options to clone it.

# Add My Project Files

Place all your project files in the cloned directly.

#Optional Tools for Enhanced Development

1.Add .gitignore: Exclude files like logs, build artifacts, or sensitive information.

2.Use GitHub Actions for CI/CD automation.

3.Collaborate with Pull Requests for team reviews.

4.Protect the main branch with GitHub branch protection rules.