CSE305 Computer Architecture
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Project #2 – Simple MIPS Emulator

Introduction

This program is an emulator which runs executables generated from the Simple MIPS assembler, which was the last assignment. This emulator does not use any special algorithms or technologies to run the executable faster.

Project Structure

The project contains three directories: `Public`, `Source`, and `Tests`. `Public` contains header files, `Source` contains C++ source files, and `Tests` contains unit tests. Source files in `Tests` are not necessary to build `runfile`.

Source contains 5 source files, whose roles are as the following:

- `Common.cc` implements common functions like hex integer parsing.
- `Emulation.cc` implements instruction execution.
- `File.cc` contains file I/O functions.
- `Main.cc` contains the entry point, parses the command-line argument, and converts errors into strings.
- `Memory.cc` implements the register file and the memory.

Build Instructions

This emulator is written in C++17. Although GCC 7 supports C++17, it lacks some standard C++17 headers (e.g. **<filesystem>** or **<charconv>**). To properly build the program, please use GCC 9 or higher. To install GCC 9 on Ubuntu 18.04, run:

```
sudo add-apt-repository ppa:ubuntu-toolchain-r/test
sudo apt update
sudo apt install gcc-9 g++-9
```

This project uses CMake 3.13. To build the program with CMake, run:

```
mkdir build
cd build
cmake -DCMAKE_CXX_COMPILER=g++-9 ..
cmake --build .

./runfile -n 10 -d input.o
```

If CMake 3.13 or higher is not available in your system, you can use this command instead:

```
g++-9 -std=c++17 -I./Public  \
      -o runfile             \
      ./Source/Common.cc     \
      ./Source/Emulation.cc  \
      ./Source/File.cc       \
      ./source/Main.cc       \
      ./Source/Memory.cc

./runfile -n 10 -d input.o
```

Unit Tests

To run the unit tests, please download Vcpkg from https://github.com/microsoft/vcpkg and install GTest. To build the unit tests with CMake, run:

```
mkdir build
cd build
cmake \
  -DCMAKE_CXX_COMPILER=g++-9 \
  -DCMAKE_TOOLCHAIN_FILE=/vcpkg/scripts/buildsystems/vcpkg.cmake \
  -DENABLE_SIMPLE_MIPS_EMU_TEST=ON \
  ..
cmake --build .
ctest
```