Remote debugging

Pieter P

Installing gdbserver to the Raspberry Pi

The toolchain includes a tool called `gdbserver`. This program will run on the Raspberry Pi, and we'll connect to it using `gdb` on our computer. First install `gdbserver` to the Pi:

```
$ scp ~/opt/x-tools/armv6-rpi-linux-gnueabihf/armv6-rpi-linux-gnueabihf/debug-root/usr/bin/gdbserver RPi0:~
$ ssh RPi0 sudo mv gdbserver /usr/local/bin
$ ssh RPi0 gdbserver --version
  GNU gdbserver (crosstool-NG UNKNOWN) 10.2
  Copyright (C) 2021 Free Software Foundation, Inc.
  gdbserver is free software, covered by the GNU General Public License.
  This gdbserver was configured as "armv6-rpi-linux-gnueabihf"
```

Installing extra libraries to the sysroot

By default, Raspberry Pi OS preloads a custom `memcpy` implementation. When debugging, GDB needs that library in the sysroot as well. Install it using:

```
$ echo "deb http://archive.raspberrypi.org/debian/ buster main" | sudo tee /var/lib/schroot/chroots/rpizero-buster-
  armhf/etc/apt/sources.list.d/raspi.list
$ wget -qO- https://archive.raspberrypi.org/debian/raspberrypi.gpg.key | sudo schroot -c source:rpizero-buster-armhf -u root
  -d / -- apt-key add -
$ sudo sbuild-apt rpizero-buster-armhf apt-get update
$ sudo sbuild-apt rpizero-buster-armhf apt-get install raspi-copies-and-fills
```

This is not necessary when your Raspberry Pi runs Ubuntu, for example.

Installing GDB on your computer

To debug ARM devices, you need an ARM version of GDB. The toolchain includes `armv6-rpi-linux-gnueabihf-gdb` that you can use.

Alternatively, you can install the `gdb-multiarch` package using:

```
$ sudo apt install gdb-multiarch
```

Running GDB manually from the command line

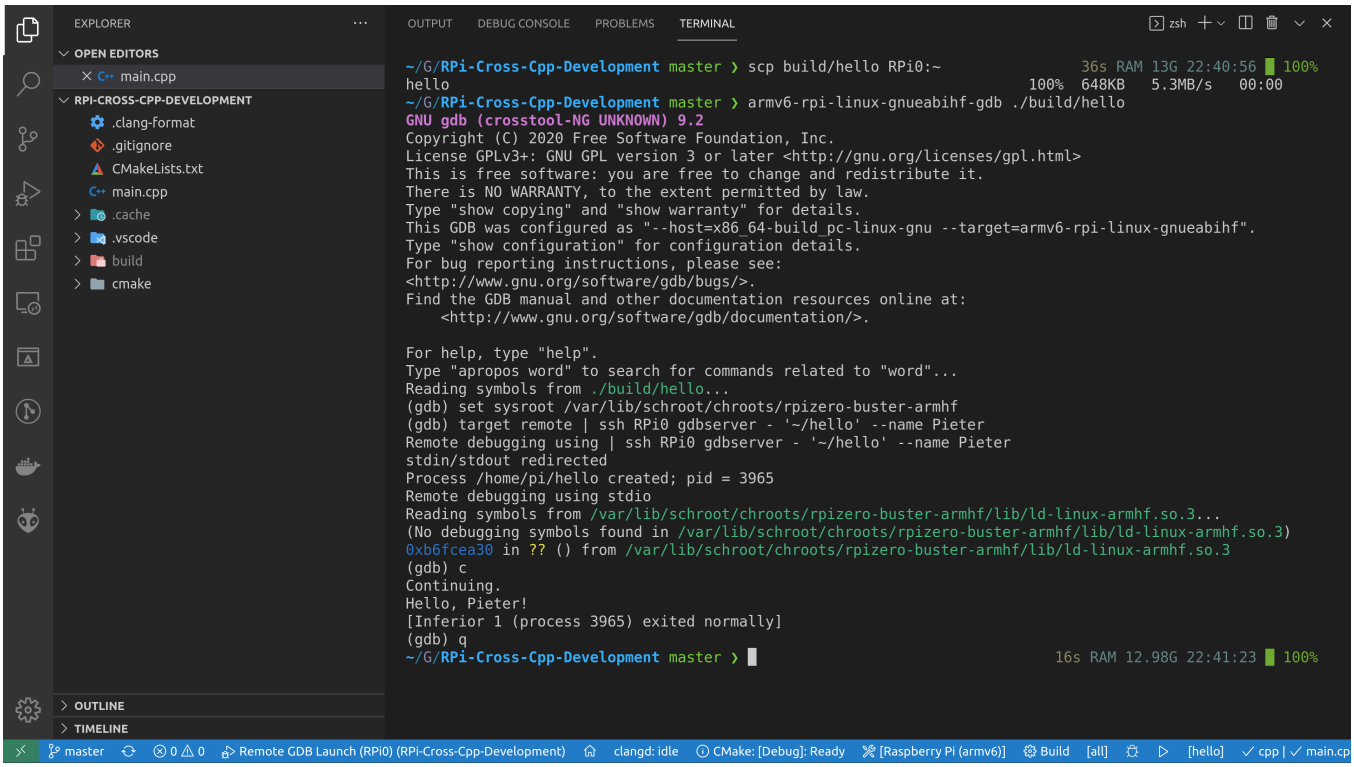
To make sure everything works correctly, let's start GDB from a command line and debug the program we compiled and copied to the Pi on the previous page:

```
$ armv6-rpi-linux-gnueabihf-gdb ./build/hello
```

Set the sysroot and start gdbserver over SSH. Then type `c` or `continue` to run the program:

```
(gdb) set sysroot /var/lib/schroot/chroots/rpizero-buster-armhf
(gdb) target remote | ssh RPi0 gdbserver - '~/hello' --name Pieter
(gdb) continue
```

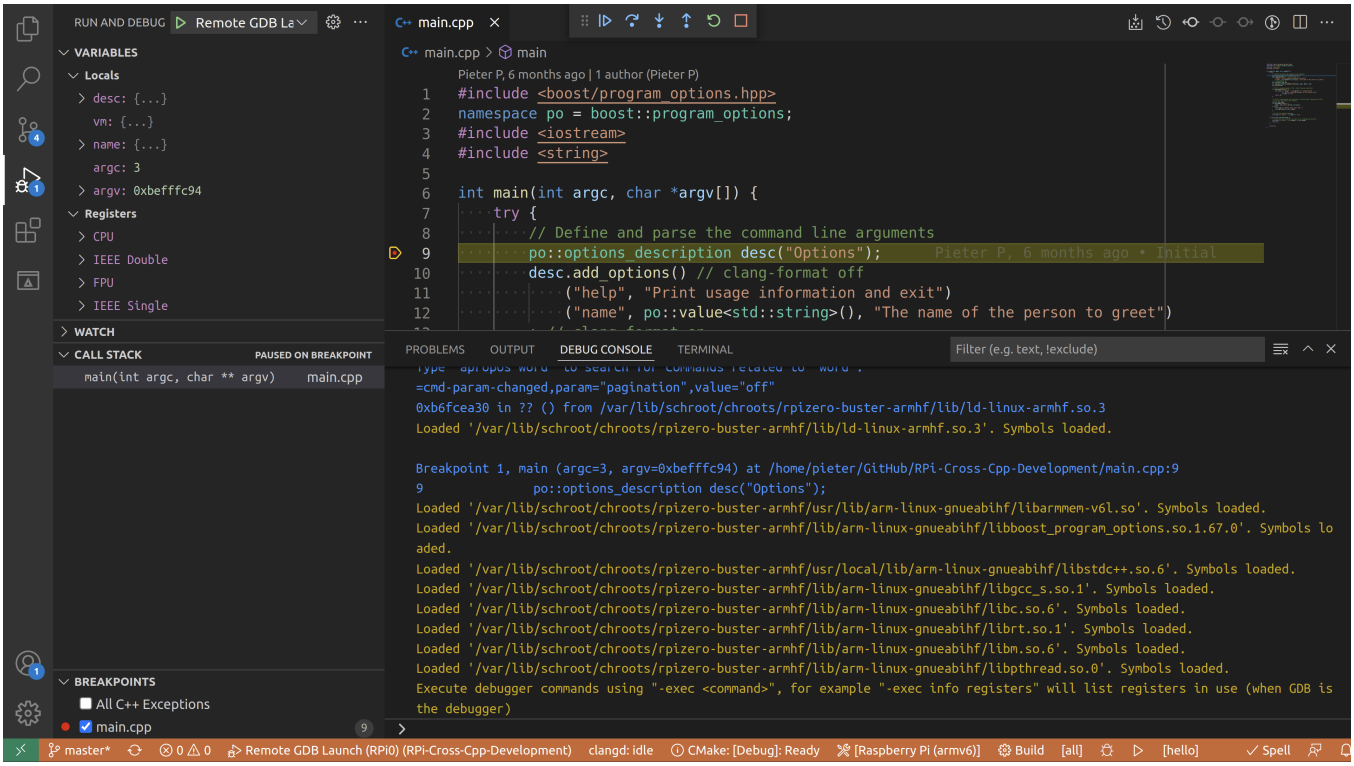
Use `q` or `Ctrl+D` to quit GDB.



Debugging using VSCode

The example project includes `task.json` and `launch.json` files that automatically copy the binary to the Raspberry Pi and start gdbserver when you hit `F5`. This allows you to set breakpoints, inspect the call stack and variables, and so on, like you would during a normal native debug session.
The “C/C++” extension by Microsoft is required for debugging support.

Before you start debugging, edit `launch.json` and edit the paths to the sysroot as appropriate. You might want to edit the SSH configuration and destination path in `tasks.json` as well.



For some reason, the standard output of the program is not visible in VSCode.