

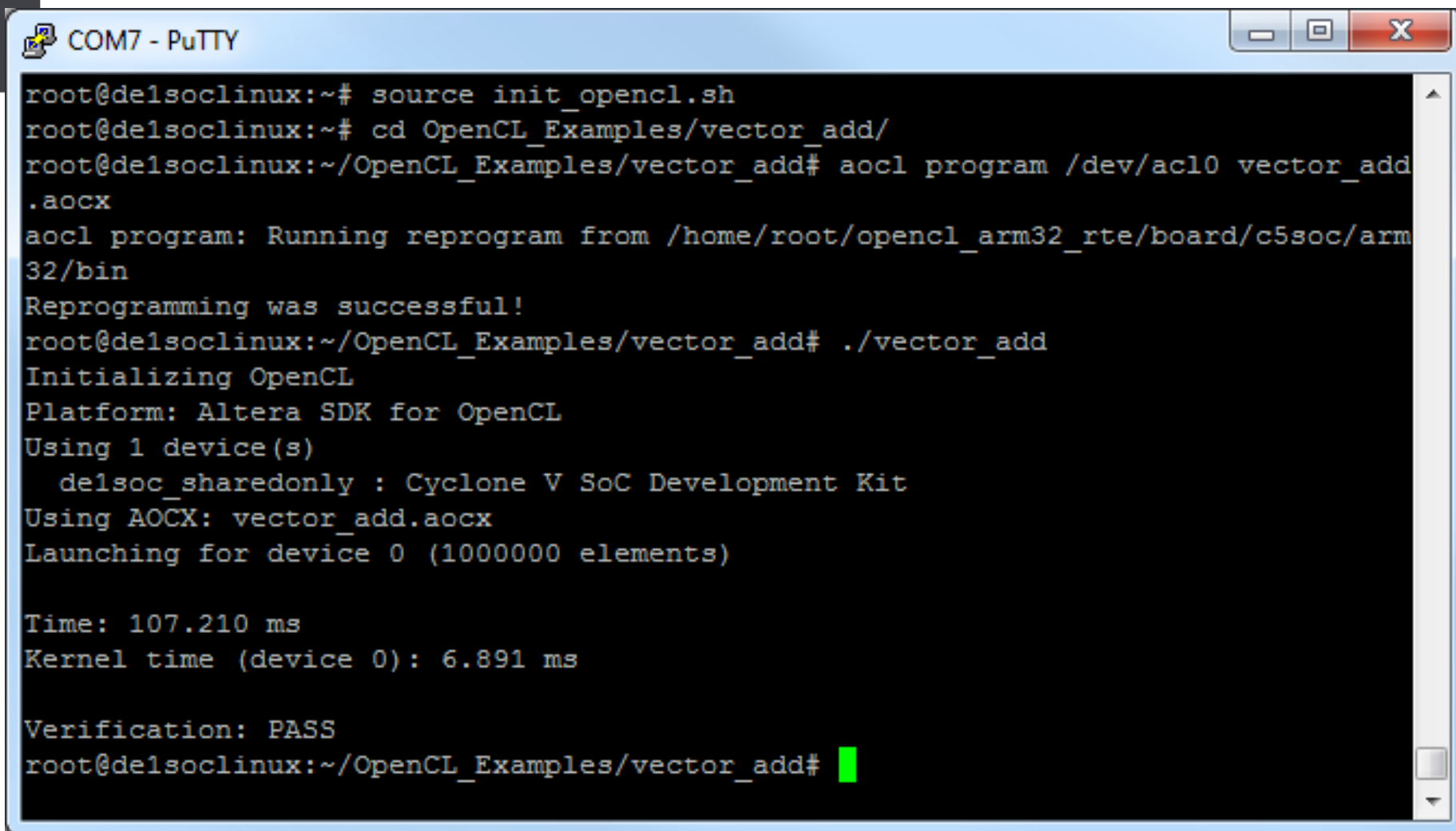
Running OpenCL on the DE1-SoC

- ◀ OpenCL application runs on top of Linux
- ◀ Linux drivers facilitate host program to FPGA (kernel) communication (via the FPGA-HPS bridges)
- ◀ Overall flow:
 - Load OpenCL drivers using a provided script
 - ◀ `source init_opencl.sh`
 - Program the FPGA with the kernel using the `aocl` utility
 - ◀ `aocl program /dev/acl0 vector_add.aocx`
 - Execute the host program
 - ◀ `./vector_add`

Exercise 8: Running an OpenCL Kernel

- Using AOCL to program and run the Vector Add example

Step 1: Connect to the DE1-SoC using Putty

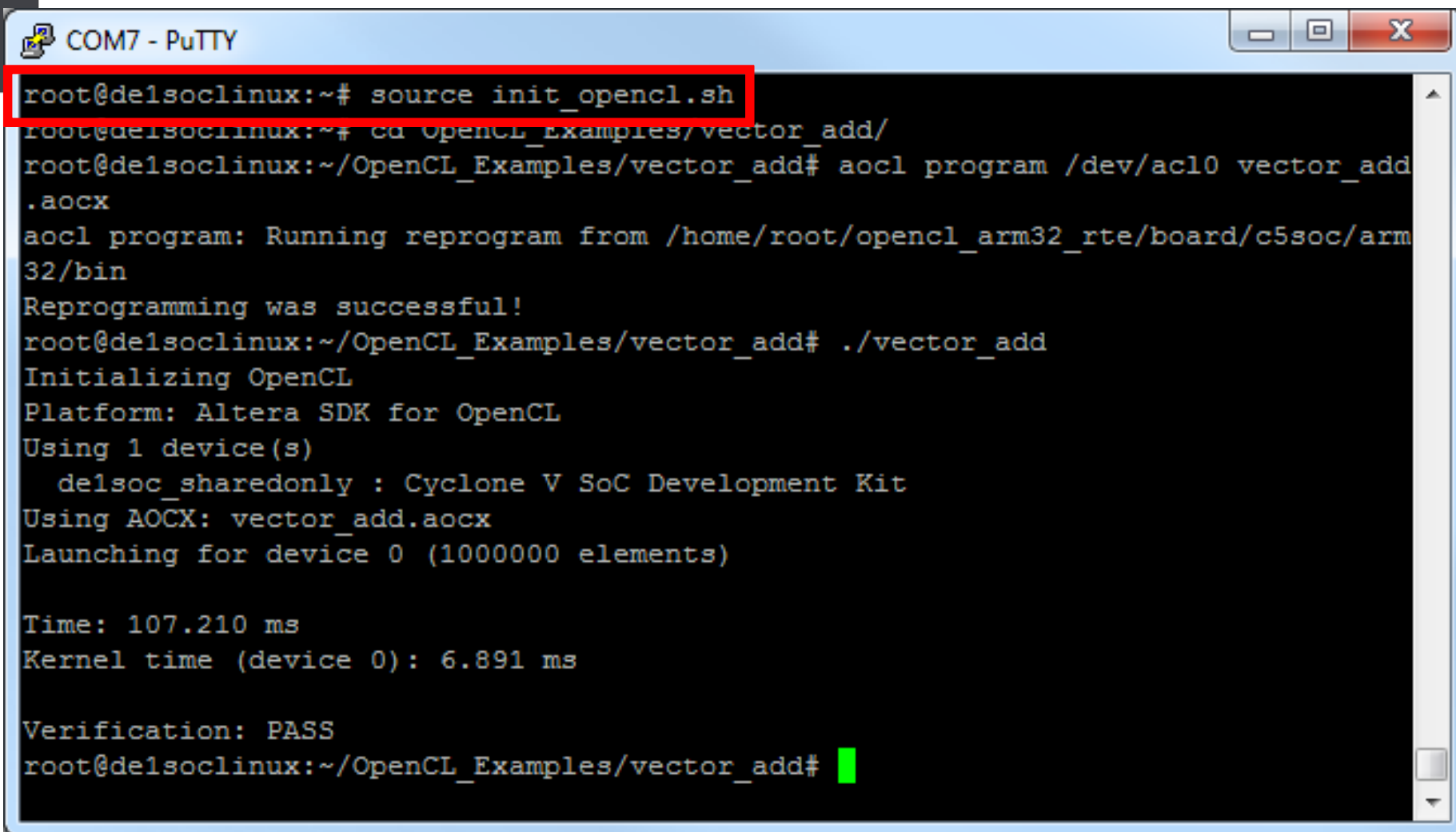


```
COM7 - PuTTY
root@de1soclinux:~# source init_openc1.sh
root@de1soclinux:~# cd OpenCL_Examples/vector_add/
root@de1soclinux:~/OpenCL_Examples/vector_add# aocl program /dev/acl0 vector_add
.aocx
aocl program: Running reprogram from /home/root/openc1_arm32_rte/board/c5soc/arm
32/bin
Reprogramming was successful!
root@de1soclinux:~/OpenCL_Examples/vector_add# ./vector_add
Initializing OpenCL
Platform: Altera SDK for OpenCL
Using 1 device(s)
    de1soc_sharedonly : Cyclone V SoC Development Kit
Using AOCX: vector_add.aocx
Launching for device 0 (1000000 elements)

Time: 107.210 ms
Kernel time (device 0): 6.891 ms

Verification: PASS
root@de1soclinux:~/OpenCL_Examples/vector_add# █
```

Step 2: Load the OpenCL Drivers

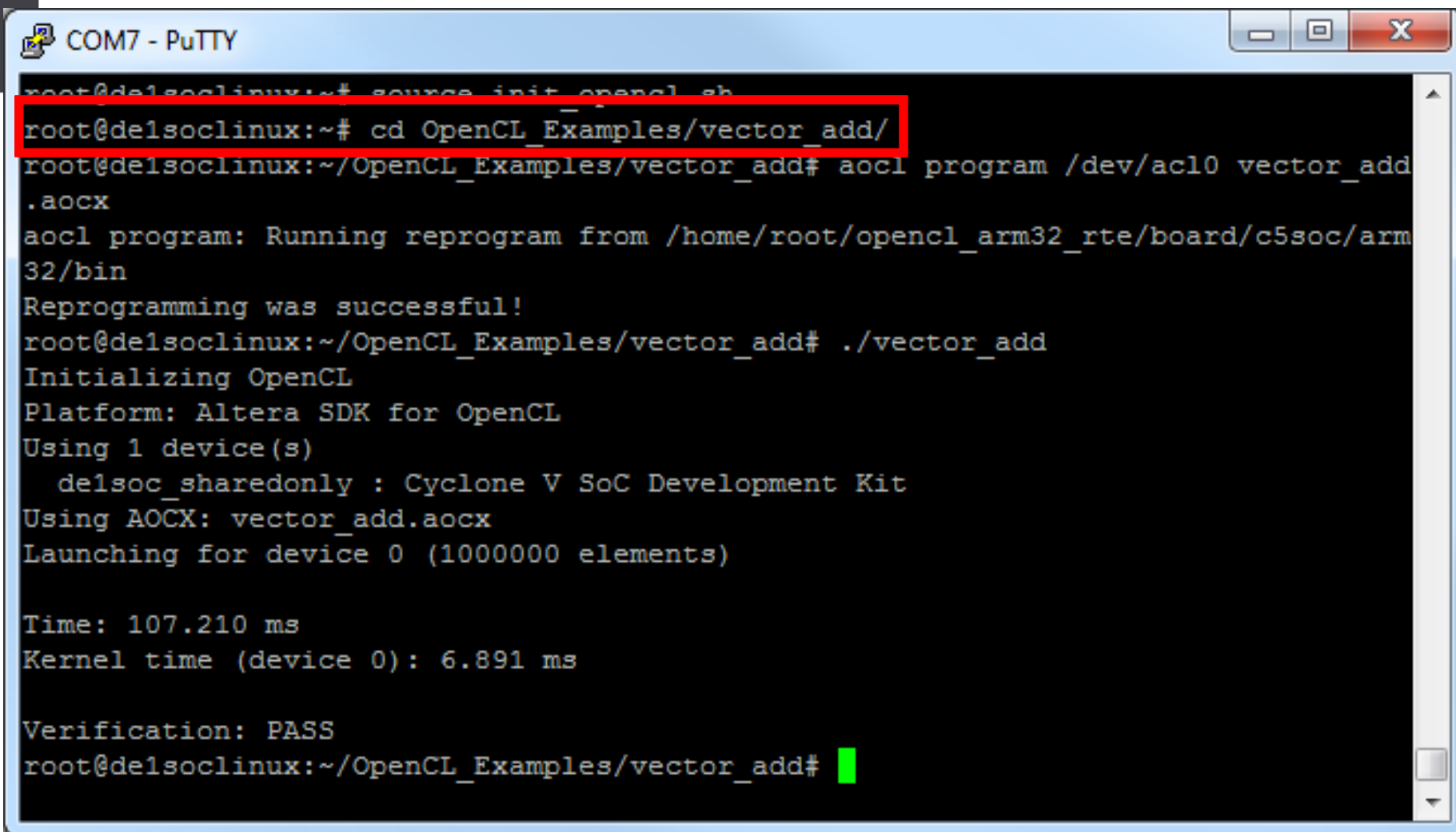


```
COM7 - PuTTY
root@delsoclinux:~# source init_opencl.sh
root@delsoclinux:~# cd OpenCL_Examples/vector_add/
root@delsoclinux:~/OpenCL_Examples/vector_add# aocl program /dev/acl0 vector_add
.aocx
aocl program: Running reprogram from /home/root/opencl_arm32_rte/board/c5soc/arm
32/bin
Reprogramming was successful!
root@delsoclinux:~/OpenCL_Examples/vector_add# ./vector_add
Initializing OpenCL
Platform: Altera SDK for OpenCL
Using 1 device(s)
    delsoc_sharedonly : Cyclone V SoC Development Kit
Using AOCX: vector_add.aocx
Launching for device 0 (1000000 elements)

Time: 107.210 ms
Kernel time (device 0): 6.891 ms

Verification: PASS
root@delsoclinux:~/OpenCL_Examples/vector_add#
```

Step 3: Switch to the Vector Add Directory



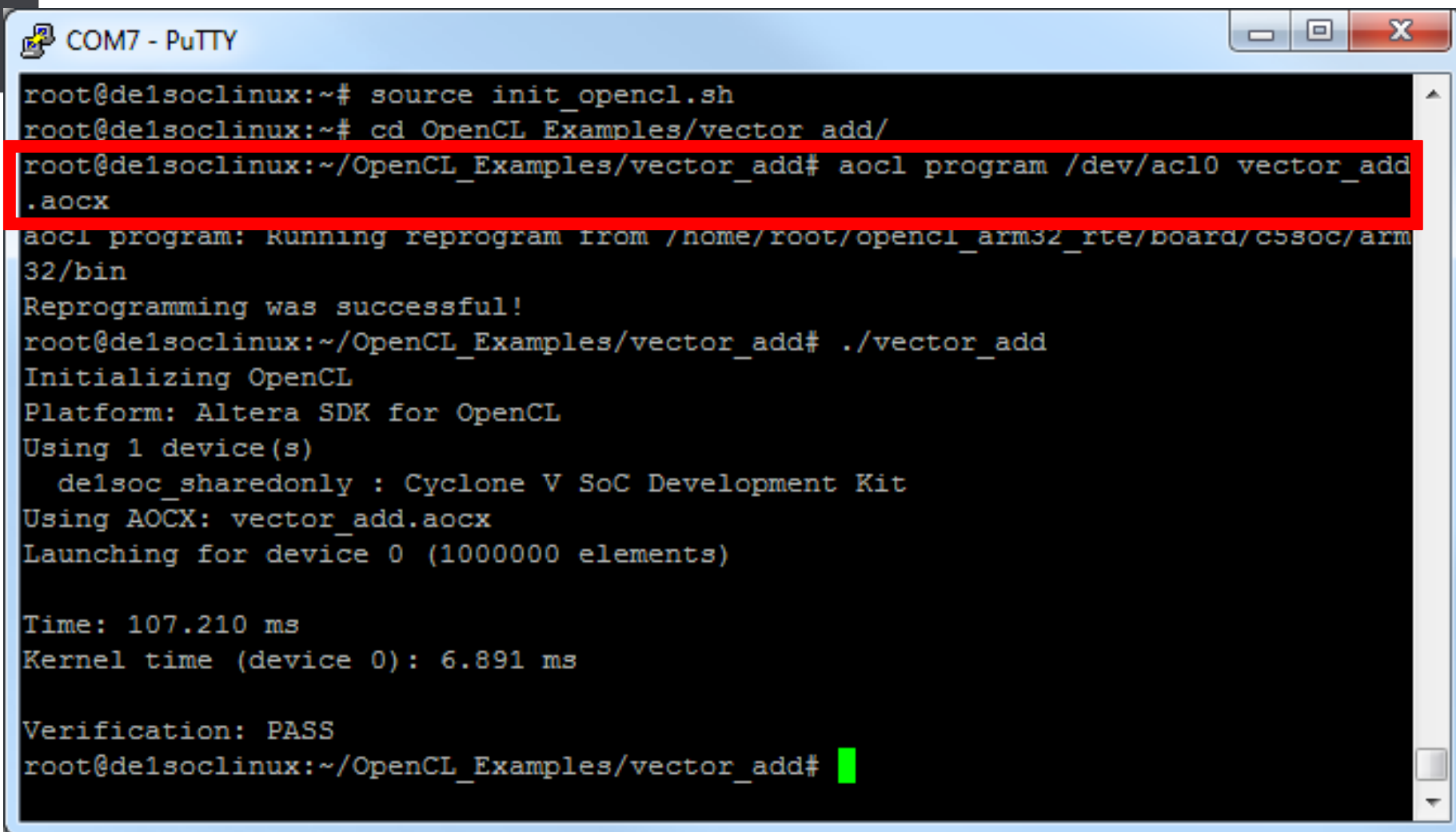
A screenshot of a PuTTY terminal window titled "COM7 - PuTTY". The terminal shows a series of commands and outputs. The command `cd OpenCL_Examples/vector_add/` is highlighted with a red rectangle. The output shows the successful reprogramming of the device and the execution of the `vector_add` program, including timing information and a verification result of "PASS".

```
root@delsoclinux:~# source init_openc1.sh
root@delsoclinux:~# cd OpenCL_Examples/vector_add/
root@delsoclinux:~/OpenCL_Examples/vector_add# aocl program /dev/acl0 vector_add
.aocx
aocl program: Running reprogram from /home/root/openc1_arm32_rte/board/c5soc/arm
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Platform: Altera SDK for OpenCL
Using 1 device(s)
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Launching for device 0 (1000000 elements)

Time: 107.210 ms
Kernel time (device 0): 6.891 ms

Verification: PASS
root@delsoclinux:~/OpenCL_Examples/vector_add#
```

Step 4: Program the FPGA with the Vector Add Kernel

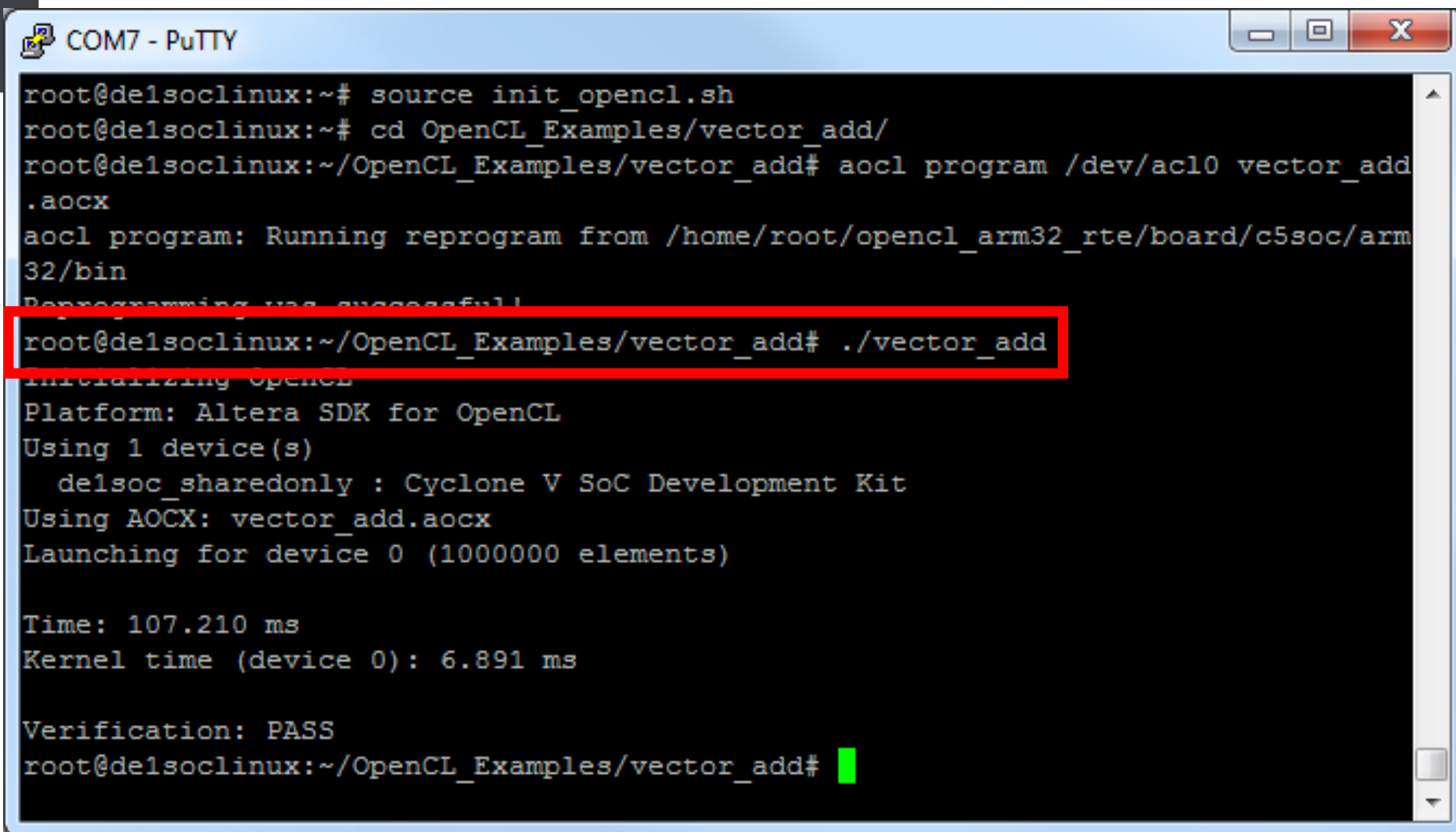


```
COM7 - PuTTY
root@delsoclinux:~# source init_opencl.sh
root@delsoclinux:~# cd OpenCL_Examples/vector_add/
root@delsoclinux:~/OpenCL_Examples/vector_add# aocl program /dev/acl0 vector_add
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aocl program: Running reprogram from /home/root/opencl_arm32_rte/board/c5soc/arm
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root@delsoclinux:~/OpenCL_Examples/vector_add# ./vector_add
Initializing OpenCL
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Using AOCX: vector_add.aocx
Launching for device 0 (1000000 elements)

Time: 107.210 ms
Kernel time (device 0): 6.891 ms

Verification: PASS
root@delsoclinux:~/OpenCL_Examples/vector_add#
```

Step 5: Execute the Host Program

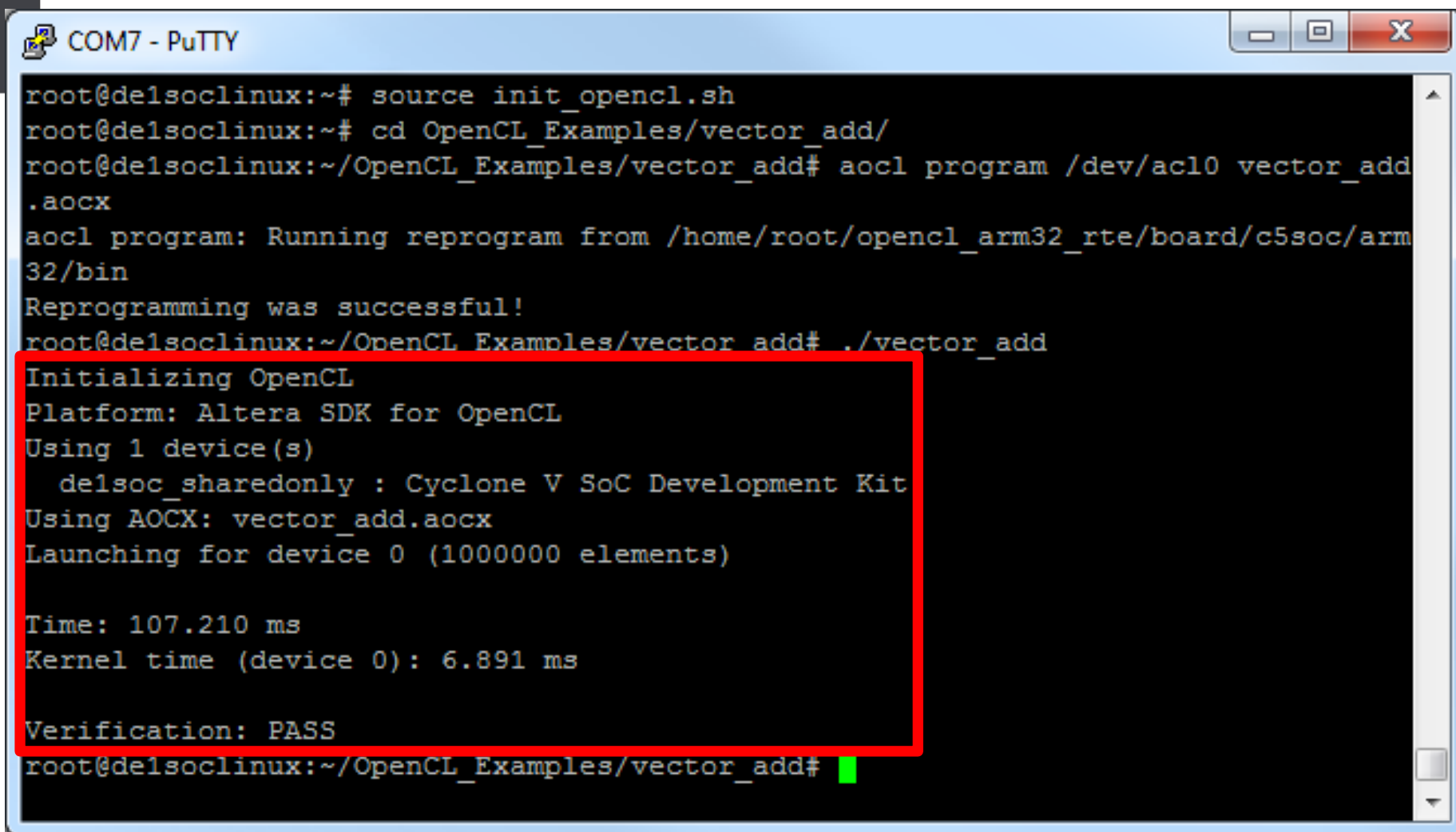


```
COM7 - PuTTY
root@delsoclinux:~# source init_opencl.sh
root@delsoclinux:~# cd OpenCL_Examples/vector_add/
root@delsoclinux:~/OpenCL_Examples/vector_add# aocl program /dev/acl0 vector_add
.aocx
aocl program: Running reprogram from /home/root/opencl_arm32_rte/board/c5soc/arm
32/bin
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root@delsoclinux:~/OpenCL_Examples/vector_add# ./vector_add
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Using AOCX: vector_add.aocx
Launching for device 0 (1000000 elements)

Time: 107.210 ms
Kernel time (device 0): 6.891 ms

Verification: PASS
root@delsoclinux:~/OpenCL_Examples/vector_add#
```

Step 6: See the Program Output



```
COM7 - PuTTY
root@delsoclinux:~# source init_openc1.sh
root@delsoclinux:~# cd OpenCL_Examples/vector_add/
root@delsoclinux:~/OpenCL_Examples/vector_add# aocl program /dev/acl0 vector_add
.aocx
aocl program: Running reprogram from /home/root/openc1_arm32_rte/board/c5soc/arm
32/bin
Reprogramming was successful!
root@delsoclinux:~/OpenCL_Examples/vector_add# ./vector_add
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