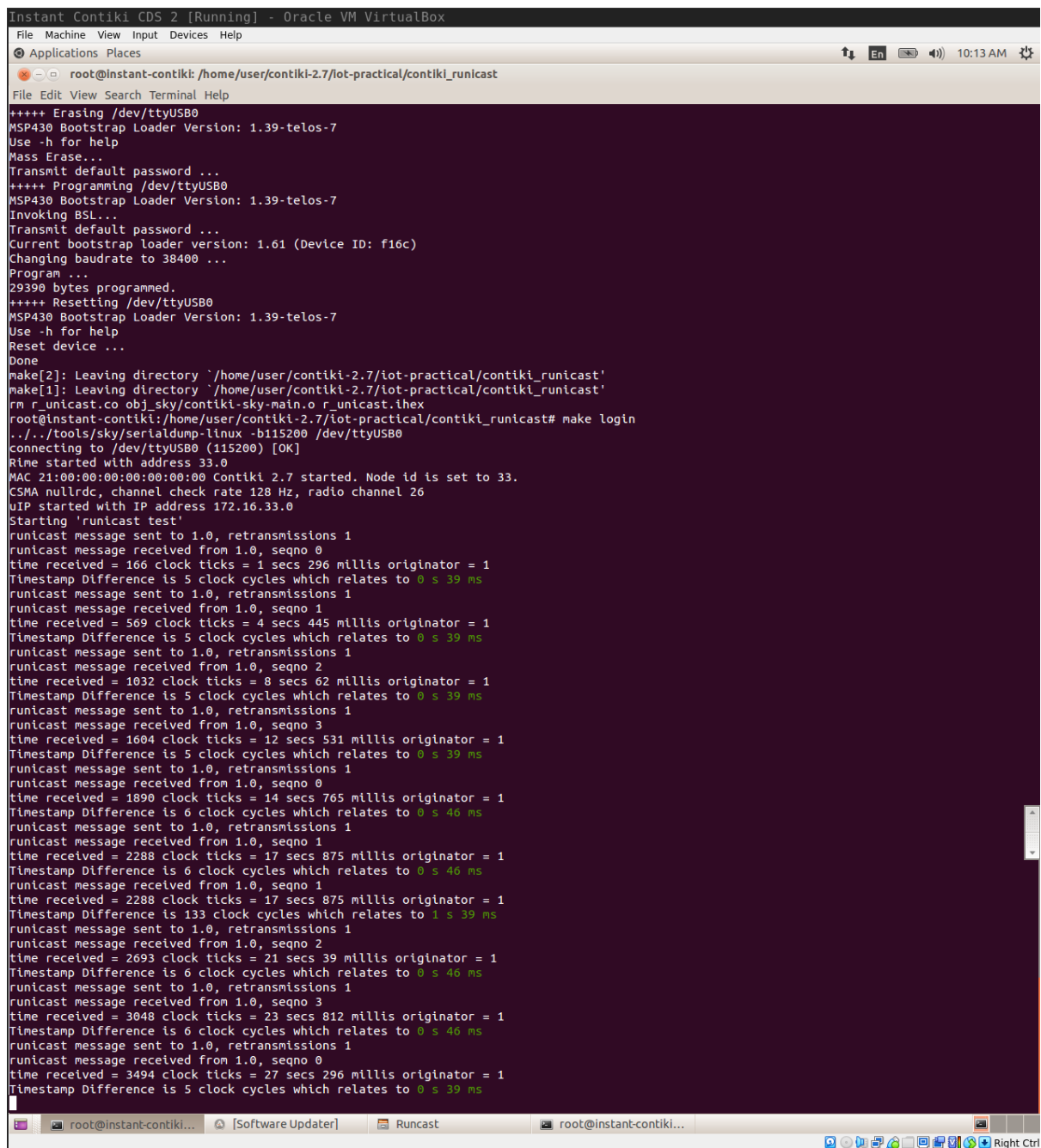


Q2 Reliable Unicasting

Your tasks:

a) alter the program above such that the node where the USER button is pressed sends a packet with its timestamp (is already done above) and THEN gets back a runicast packet with the timestamp it has initially written into the first packet. Based on this packet, compute the Route-trip time at the node initiating the packet exchange and print it to the serial interface.

b) compare the latency with that from unicast exercise. Explain the differences (add your answer as comments or separate file).



```
Instant Contiki CDS 2 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Applications Places
root@instant-contiki: /home/user/contiki-2.7/iot-practical/contiki_runicast
File Edit View Search Terminal Help
++++ Erasing /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Mass Erase...
Transmit default password ...
++++ Programming /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Invoking BSL...
Transmit default password ...
Current bootstrap loader version: 1.61 (Device ID: f16c)
Changing baudrate to 38400 ...
Program ...
29390 bytes programmed.
++++ Resetting /dev/ttyUSB0
MSP430 Bootstrap Loader Version: 1.39-telos-7
Use -h for help
Reset device ...
Done
make[2]: Leaving directory `/home/user/contiki-2.7/iot-practical/contiki_runicast'
make[1]: Leaving directory `/home/user/contiki-2.7/iot-practical/contiki_runicast'
rm r_unicast.co obj_sky/contiki-sky-main.o r_unicast.ihex
root@instant-contiki: /home/user/contiki-2.7/iot-practical/contiki_runicast# make login
../tools/sky/serialedump-linux -b115200 /dev/ttyUSB0
connecting to /dev/ttyUSB0 (115200) [OK]
Rime started with address 33.0
MAC 21:00:00:00:00:00 Contiki 2.7 started. Node id is set to 33.
CSMA nullrdc, channel check rate 128 Hz, radio channel 26
uIP started with IP address 172.16.33.0
Starting 'runicast test'
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 0
time received = 166 clock ticks = 1 secs 296 millis originator = 1
Timestamp Difference is 5 clock cycles which relates to 0 s 39 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 1
time received = 569 clock ticks = 4 secs 445 millis originator = 1
Timestamp Difference is 5 clock cycles which relates to 0 s 39 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 2
time received = 1032 clock ticks = 8 secs 62 millis originator = 1
Timestamp Difference is 5 clock cycles which relates to 0 s 39 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 3
time received = 1604 clock ticks = 12 secs 531 millis originator = 1
Timestamp Difference is 5 clock cycles which relates to 0 s 39 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 0
time received = 1890 clock ticks = 14 secs 765 millis originator = 1
Timestamp Difference is 6 clock cycles which relates to 0 s 46 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 1
time received = 2288 clock ticks = 17 secs 875 millis originator = 1
Timestamp Difference is 6 clock cycles which relates to 0 s 46 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 1
time received = 2288 clock ticks = 17 secs 875 millis originator = 1
Timestamp Difference is 133 clock cycles which relates to 1 s 39 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 2
time received = 2693 clock ticks = 21 secs 39 millis originator = 1
Timestamp Difference is 6 clock cycles which relates to 0 s 46 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 3
time received = 3048 clock ticks = 23 secs 812 millis originator = 1
Timestamp Difference is 6 clock cycles which relates to 0 s 46 ms
runicast message sent to 1.0, retransmissions 1
runicast message received from 1.0, seqno 0
time received = 3494 clock ticks = 27 secs 296 millis originator = 1
Timestamp Difference is 5 clock cycles which relates to 0 s 39 ms
```

As One can see from the screenshot, the usual round trip time is 5 or 6 clock ticks which results in **39 or 46 ms**

When comparing the two executions (unicast and reliable unicast) we see a difference of 1 to 2 clock cycles in round-trip execution times.

The difference here will most likely come from the acknowledgement Package that is sent. But to be honest I would have expected sending an acknowledgement package would make a bigger difference than 1 to 2 clock cycles.