

# Lab 3 Writeup

---

My name: [刘轩昂]

My Student number : [201220198]

This lab took me about [5] hours to do. I [did] attend the lab session.

## 1. Program Structure and Design:

1. 需要实现序列号、绝对序列号和stream索引的解释和转换方法wrap()和unwrap()
2. 完成TCP reciever

## 2. Implementation:

- 实现wrap()和unwrap() :  
对于wrap(), 直接相加;

```
// wrapping_integers.cc
WrappingInt32 wrap(uint64_t n, WrappingInt32 isn) {
    return WrappingInt32{static_cast<uint32_t>(n) + isn.raw_value()};
}
```

而对于unwrap(), 需要引入checkpoint来进行判断:

```
uint64_t unwrap(WrappingInt32 n, WrappingInt32 isn, uint64_t checkpoint) {
    int32_t offset = n - wrap(checkpoint, isn);
    int64_t s = offset + checkpoint; //
    if (s >= 0) {return static_cast<uint64_t>(s);}
    else {return s + (1ul << 32);}
}
```

- TCP receiver

```
void TCPReceiver::segment_received(const TCPSegment &seg) {
    if (seg.header().syn || _isn != nullopt){
        if (seg.header().syn) _isn = seg.header().seqno;
        // unwrap
        uint64_t absSeq = unwrap(seg.header().seqno + static_cast<int>
(seg.header().syn), _isn.value(), _checkpoint);
        _reassembler.push_substring(seg.payload().copy(), absSeq-1,
seg.header().fin); // stream indices = absSeq-1
        _checkpoint += seg.length_in_sequence_space(); //更新checkpoint
    }
}
```

```
optional<WrappingInt32> TCPReceiver::ackno() const {
    if (_isn == nullopt) return nullopt;
    return wrap(stream_out().bytes_written() + stream_out().input_ended() +
1, _isn.value());
}
size_t TCPReceiver::window_size() const { return _capacity -
stream_out().buffer_size(); }
```

### 3. Test:

```
→ build git:(master) ✗ ctest -R wrap
Test project /home/neo/Desktop/vscode/c_net/lab3-neoabridges/sponge/build
  Start 1: t_wrapping_ints_cmp
1/4 Test #1: t_wrapping_ints_cmp ..... Passed    0.00 sec
  Start 2: t_wrapping_ints_unwrap
2/4 Test #2: t_wrapping_ints_unwrap ..... Passed    0.00 sec
  Start 3: t_wrapping_ints_wrap
3/4 Test #3: t_wrapping_ints_wrap ..... Passed    0.00 sec
  Start 4: t_wrapping_ints_roundtrip
4/4 Test #4: t_wrapping_ints_roundtrip ..... Passed    0.08 sec

100% tests passed, 0 tests failed out of 4

Total Test time (real) =_ 0.09 sec

-----
24/26 Test #52: t_address_dt .....
  Start 53: t_parser_dt
25/26 Test #53: t_parser_dt .....
  Start 54: t_socket_dt
26/26 Test #54: t_socket_dt .....

100% tests passed, 0 tests failed out of 26

Total Test time (real) = 1.06 sec
[100%] Built target check_lab3
→ build git:(master) ✗
```