Computer Network - *Homework Assignment 1*

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- How to execute:

./sender <sender IP> <agent IP> <sender port> <agent port> <test filename>

Ex. ./sender local local 8887 8888 test.txt

./receiver <agent IP> <recv IP> <agent port> <recv port> <result filename>

Ex. ./receiver local local 8888 8889 result.txt

(local = localhost = 0.0.0.0 = 127.0.0.1)

- Program structure:

- The steps at the beginning of all three programs are as follows.

  1. Create UDP socket (senderSocket, agentSocket, receiverSocket)

  2. Bind socket

- Data structure in three programs is the same.

  length → the length of data

  seqNumber → the number of data
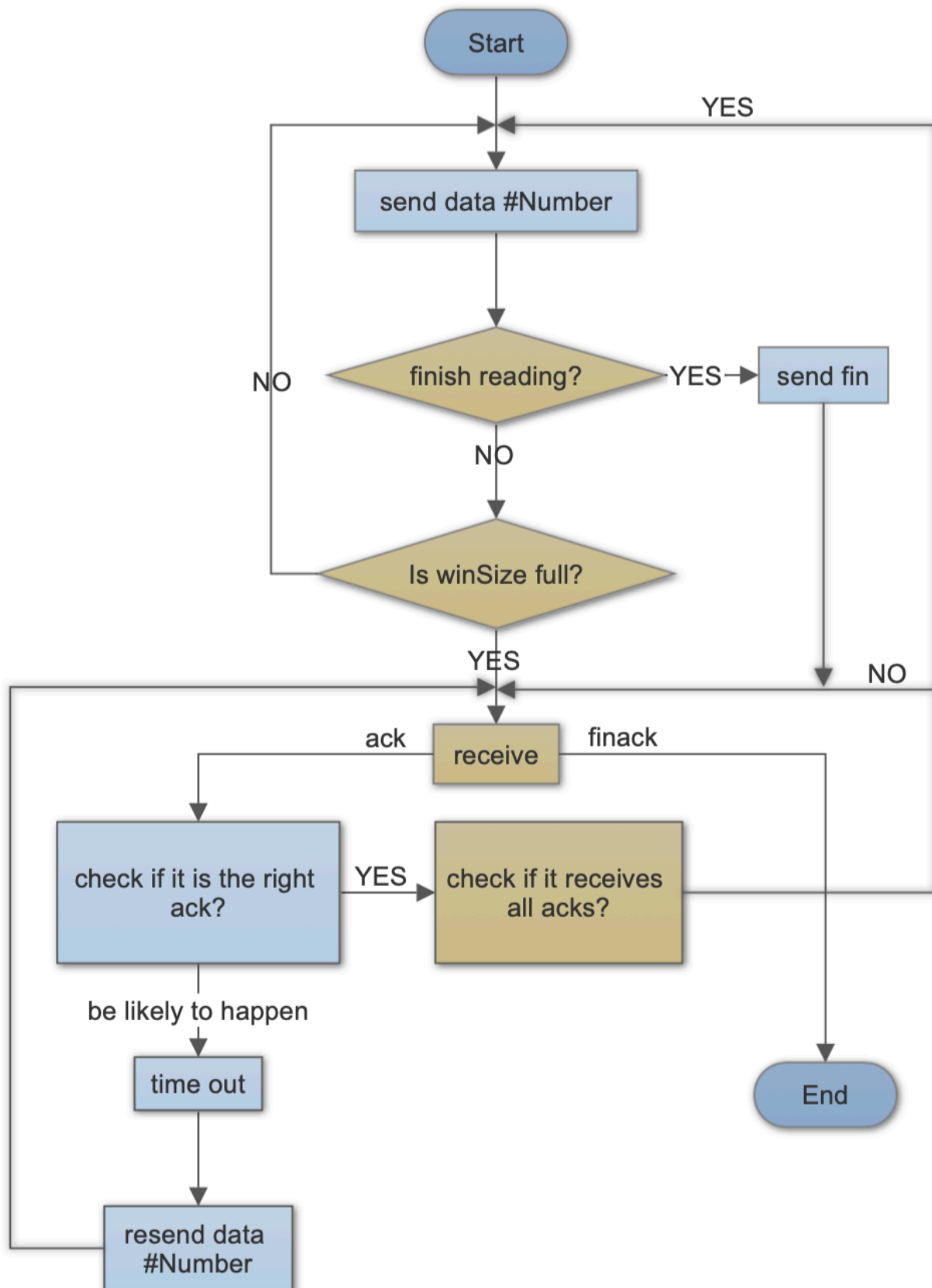
  ackNumber → the number of ack

  fin → if sender finishes sending all data

  ack → if it is an ack or not

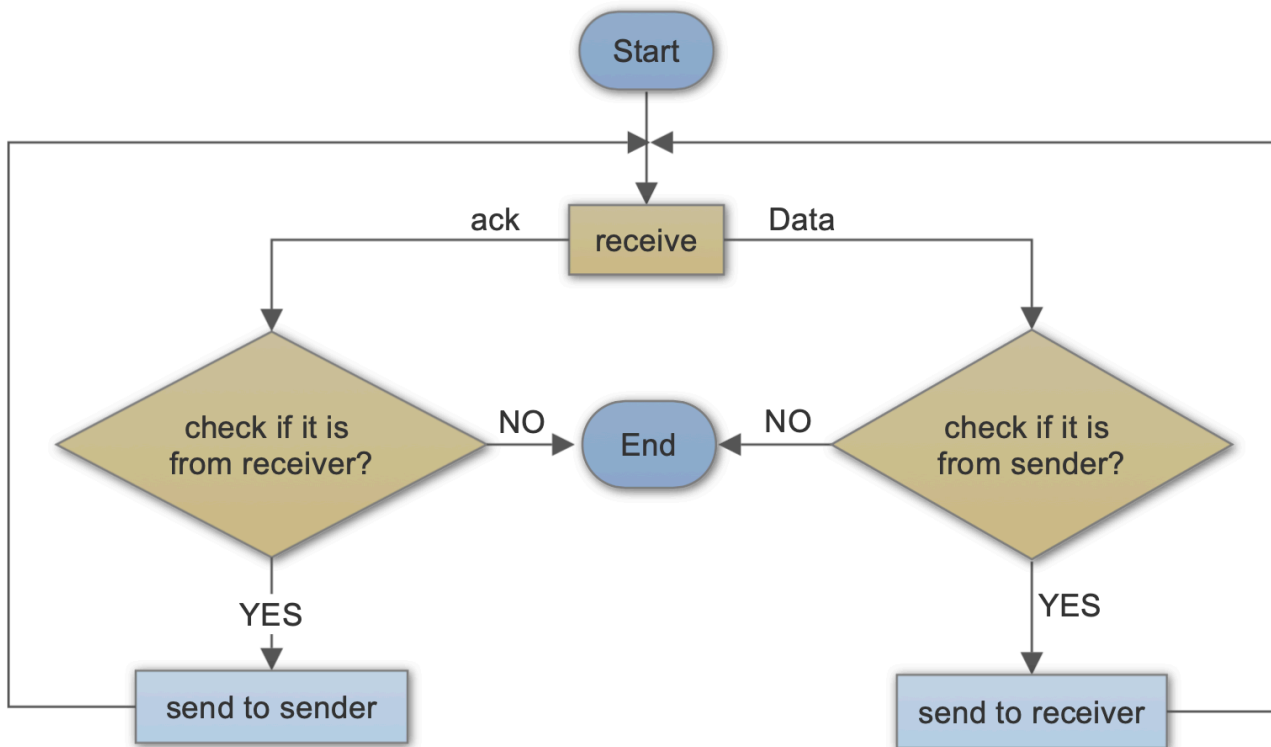 data → record the sending data

```c
typedef struct {
    int length;
    int seqNumber;
    int ackNumber;
    int fin;
    int syn;
    int ack;
} header;

typedef struct {
    header head;
    char data[1000];
} segment;
```

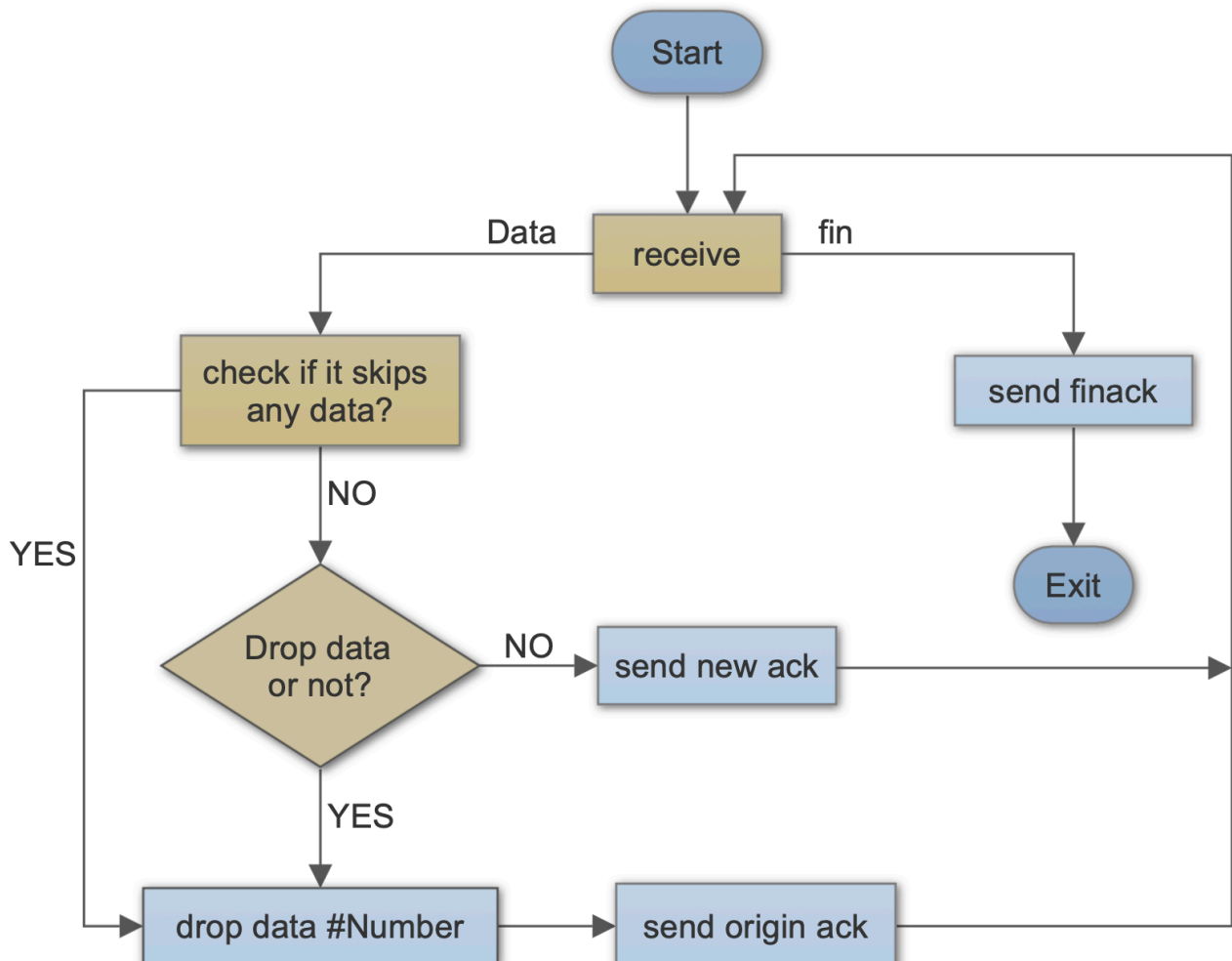- Sender Flow Chart:

- Agent Flow Chart:

```
                        ┌─────────┐
                        │  Start  │
                        └────┬────┘
                             │
        ┌────────────────────┼────────────────────┐
        │                    ▼                     │
        │     ack      ┌──────────┐    Data        │
        │   ┌──────────│ receive  │──────────┐     │
        │   │          └──────────┘          │     │
        │   ▼                                ▼     │
  ╱────────────╲                       ╱────────────╲
 ╱ check if it  ╲   NO  ┌─────┐  NO   ╱ check if it   ╲
 ╲ is from       ╲─────▶│ End │◀─────╲ is from sender? ╱
  ╲ receiver?    ╱      └─────┘       ╲               ╱
   ╲────────────╱                      ╲─────────────╱
        │ YES                               │ YES
        ▼                                   ▼
 ┌──────────────┐                  ┌──────────────────┐
 │send to sender│                  │ send to receiver │
 └──────────────┘                  └──────────────────┘
```

- Receiver Flow Chart:

```
                        ┌─────────┐
                        │  Start  │
                        └────┬────┘
                             │
                ┌────────────┼───────────────────────┐
       Data     ▼            ▼         fin            │
     ┌──────────┤ receive ├──────────────┐           │
     │          └─────────┘              │           │
     ▼                                   ▼           │
┌──────────────┐                ┌──────────────┐     │
│check if it   │                │ send finack  │     │
│skips any data?│               └──────┬───────┘     │
└──────┬───────┘                       ▼             │
   │   │ NO                        ┌───────┐         │
YES│   ▼                           │ Exit  │         │
   │ ╱──────────╲   NO             └───────┘         │
   │╱ Drop data  ╲─────▶┌──────────────┐             │
   │╲ or not?    ╱      │ send new ack │─────────────┘
   │ ╲──────────╱       └──────────────┘
   │      │ YES
   │      ▼
   │ ┌──────────────────┐      ┌──────────────────┐
   └▶│ drop data #Number │─────▶│ send origin ack  │───┐
     └──────────────────┘      └──────────────────┘   │
```

- *Difficulties:*

I have trouble drawing three flow charts for sender.c, agent.c and receiver.c seeing that it is quite easy to miss some points when drawing the flow charts, and then I need to redraw it again and again.

- *Solutions:*

1. Be careful when drawing.

2. Keep checking.

3. Keep drawing.