Bruno Takeshi Hori RA:145539
Carolina Regattieri Delgado RA:145666

Atividade 2

Parte 1

No código do client, a única parte adicionada ao código foi para especificar a porta e IP locais:

```
    /* obter informacoes sobre socket local */
socklen_t s_len = sizeof(socket_address);

if (getsockname(s, (struct sockaddr *)&socket_address, &s_len) == -1)
    printf(" ERROR getsockname ERROR\n");
else
    printf("Local IP Address: %s\n", inet_ntoa(socket_address.sin_addr));
    printf("Local Port Number: %d\n", ntohs(socket_address.sin_port));
```

Funções utilizadas:

- **Getsockname** retorna no buffer socket_address o endereço atual ao qual o socket s está atrelado.
- **Inet_ntoa** função que converte o endereço dado em network byte order para uma string na notação IPv4 com ponto e decimais.
- **Ntohs** função que converte um inteiro de network byte order para host byte order

No código do server, houve diversas mudanças para fazer o fork e as leituras do IP e porta do cliente:

```
while (1) {
    new_s = sizeof(client);
    /* aguardar/aceita conexão, receber e imprimir texto na tela, enviar eco */
 //(...)

    ac = accept(s,(struct sockaddr *)&client,&new_s);
    if (ac == -1){
        printf("Error in accepting.\n");
        exit(1);
    }
    else {
```

```
        leng = sizeof(socket_address);

        if (getpeername(ac, (struct sockaddr *)&socket_address, &leng) == -1)
               printf("ERROR\nCould not getsockname\n");
           else {
               printf("\nLocal IP Address: %s\n", inet_ntoa(socket_address.sin_addr));
               printf("Local Port Number: %d\n\n", ntohs(socket_address.sin_port));
           }
      }
      if ((p = fork()) == 0) {
          do{
              bzero(buf,MAX_LINE);
              valid = read(ac,buf, MAX_LINE);
              if (valid <= 0){
                  printf("ERROR\nCould not read from socket\n");
                  exit(1);
              }
              leng = sizeof(socket_address);

              if (getpeername(ac, (struct sockaddr *)&socket_address, &leng) == -1)
                  printf("ERROR\nCould not getsockname\n");
              else
                  printf("Client IP Address: %s\n", inet_ntoa(socket_address.sin_addr));

              printf("Message: %s\n",buf);
              valid = write(ac,buf, MAX_LINE);
              if (valid <= 0) {
                  printf("ERROR\nCould not write to socket\n");
                  exit(1);
              }

          } while(strcmp(buf,"quit\n") != 0);
      }
      else if (p > 0) {
          close(ac);
          continue;
      }
      else {
          printf("Error in forking.\n");
          close(ac);
          continue;
      }
  }
```

Funções utilizadas:

- **Fork** cria um novo processo, duplicando o processo atual. O novo processo é chamado de filho, e o antigo de pai.
- **Getpeername** retorna no buffer socket_address o endereço atual do cliente conectado ao socket s.

- **Inet_ntoa** função que converte o endereço dado em network byte order para uma string na notação IPv4 com ponto e decimais.
- **Ntohs** função que converte um inteiro de network byte order para host byte order

Testes

Teste 1:

Server ->

Waiting for client connecttion...

Local IP Address: 143.106.16.60
Local Port Number: 48890

Local IP Address: 143.106.16.57
Local Port Number: 55760

Client IP Address: 143.106.16.60
Message: Oi sou a Luluzinha

Client IP Address: 143.106.16.57
Message: Oi sou o Jon!

Client IP Address: 143.106.16.57
Message: Que legal

ERROR
Could not read from socket
Client IP Address: 143.106.16.60
Message: OK cansei

ERROR
Could not read from socket
^C

Cliente 1 ->

Connected to server garfield.
Local IP Address: 143.106.16.60
Local Port Number: 48890
To end connection press 'Ctrl+C' .

Please enter a message: Oi sou a Luluzinha
ECO Responce from server:
Oi sou a Luluzinha

Please enter a message: OK cansei
ECO Responce from server:
OK cansei

Please enter a message: ^C

Cliente 2 ->

Connected to server garfield.
Local IP Address: 143.106.16.57
Local Port Number: 55760
To end connection press 'Ctrl+C' .

Please enter a message: Oi sou o Jon!
ECO Responce from server:
Oi sou o Jon!

Please enter a message: Que legal
ECO Responce from server:
Que legal

Please enter a message: ^C

Esse teste mostra dois clientes, com IPs diferentes, conectados a um mesmo server num terceiro IP.
As mensagens de "*ERROR Could not read from socket"* são referentes a quando algum dos clientes se desconecta do server.

Teste 2:

Server ->

Waiting for client connecttion...

Local IP Address: 143.106.16.55
Local Port Number: 34306

Local IP Address: 143.106.16.55
Local Port Number: 34310

Local IP Address: 143.106.16.55
Local Port Number: 34312

Local IP Address: 143.106.16.55
Local Port Number: 34314

Local IP Address: 143.106.16.55
Local Port Number: 34316

Client IP Address: 143.106.16.55
Message: oi sou o client 1

Client IP Address: 143.106.16.55
Message: oi sou o client 2

Client IP Address: 143.106.16.55
Message: oi sou o client 3

Client IP Address: 143.106.16.55
Message: oi sou o client 4

Client IP Address: 143.106.16.55
Message: oi sou o client 5

Client IP Address: 143.106.16.55
Message: o client 5 gosta de falar mais

ERROR
Could not read from socket
ERROR
Could not read from socket
ERROR
Could not read from socket
ERROR
Could not read from socket
ERROR
Could not read from socket

Client 1 ->

Connected to server garfield.
Local IP Address: 143.106.16.55
Local Port Number: 34310
To end connection press 'Ctrl+C' .

Please enter a message: oi sou o client 1
ECO Responce from server:
oi sou o client 1

Please enter a message: ^C

Client 2 ->

Connected to server garfield.
Local IP Address: 143.106.16.55
Local Port Number: 34312
To end connection press 'Ctrl+C' .

Please enter a message: oi sou o client 2
ECO Responce from server:
oi sou o client 2

Please enter a message: ^C

Client 3 ->

Connected to server garfield.
Local IP Address: 143.106.16.55
Local Port Number: 34314
To end connection press 'Ctrl+C' .

Please enter a message: oi sou o client 3
ECO Responce from server:
oi sou o client 3

Please enter a message: ^C

Client 4 ->

Connected to server garfield.
Local IP Address: 143.106.16.55
Local Port Number: 34316
To end connection press 'Ctrl+C' .

Please enter a message: oi sou o client 4
ECO Responce from server:
oi sou o client 4

Please enter a message: ^C

Client 5 ->

Connected to server garfield.
Local IP Address: 143.106.16.55
Local Port Number: 34306
To end connection press 'Ctrl+C' .

Please enter a message: oi sou o client 5
ECO Responce from server:
oi sou o client 5

Please enter a message: o client 5 gosta de falar mais
ECO Responce from server:
o client 5 gosta de falar mais

Please enter a message: ^C

Esse teste mostra 5 clientes que possuem o mesmo IP (estão sendo executados no mesmo computador) conectados a um server que também possui o mesmo IP.
Note que as portas usadas são todas diferentes.