## P3 – Comunicação 1:n

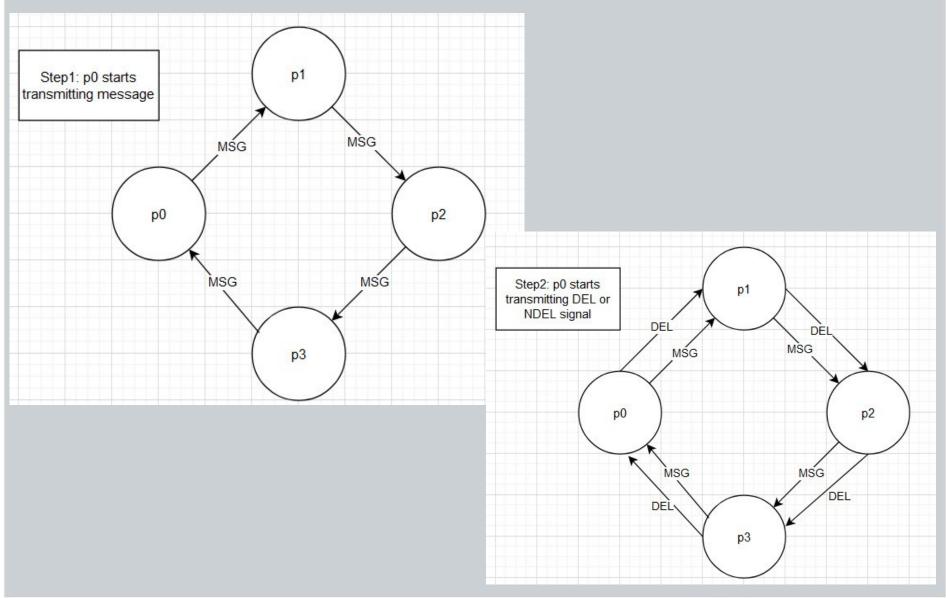
INE5424-06208B (20242) – Sistemas Operacionais II | Curso de Ciências da Computação



### Modificação da arquitetura

- Não foi implementado ARB nesta entrega devido a escolha do grupo de modificar a arquitetura da implementação, optando por uma implementação via ring, utilizada tanto para Uniform Reliable Broadcast quanto para Atomic Reliable Broadcast.
- No momento, o ordenamento de mensagens só é garantido entre mensagens enviadas pelo mesmo nodo.

#### Transmissão em anel



UFSC UNIVERSIDADE FEDERAL
DE SANTA CATARINA

## Execução

```
luiz@Luiz-Notebook:~/repos/so2$ ./my project 0 A
                                                    luiz@Luiz-Notebook:~/repos/so2$ ./my project 1 A
                                                                                                          luiz@Luiz-Notebook:~/repos/so2$ ./my project 2 AB
                                                                                                                                                                      luiz@Luiz-Notebook:~/repos/so2$ ./my project 3 AB
                                                                                                            ---- Executando Atomic Broadcast -----
                                                                                                                                                                       ---- Executando Atomic Broadcast -----
---- Executando Atomic Broadcast ----
                                                      ---- Executando Atomic Broadcast ----
                                                                                                            [INFO] received new message
                                                                                                                                                                       [INFO] received new message
Broadcasting message1 -----
                                                      [INFO] received new message
                                                                                                            [DEBUG] checking if syn
                                                                                                                                                                       [DEBUG] checking if syn
[INFO] Tentativa de broadcast #1 para o nó 1
                                                      [DEBUG] checking if syn
                                                                                                            [DEBUG] it is syn, loop entered, sending ack
                                                                                                                                                                       [DEBUG] it is syn, loop entered, sending ack
INFOl next node: 1
                                                      [DEBUG] it is syn, loop entered, sending ack
                                                                                                            [INFO] Send ack recv msg
                                                                                                                                                                        [INFO] Send ack recv msg
[INFO] send message
                                                       [INFO] Send ack recv msg
                                                                                                            [INFO] Contents received
                                                                                                                                                                        [INFO] Contents received
[INFO] correct ACK
                                                       [INFO] Contents received
                                                                                                            [DEBUG] Sending CLOSE
                                                                                                                                                                        [DEBUG] Sending CLOSE
[DEBUG] Send SYN succesfull
                                                      [DEBUG] Sending CLOSE
                                                                                                            [DEBUG] exiting receive()
                                                                                                                                                                        [DEBUG] exiting receive()
[INFO] correct CLOSE
                                                      [DEBUG] exiting receive()
                                                                                                            [INFO] AB: Delivering message from node 1
                                                                                                                                                                        [INFO] AB: Delivering message from node 2
[DEBUG] Send CONTENTS succesfull
                                                      [INFO] AB: Delivering message from node 0
                                                                                                            [INFO] send_message
                                                                                                                                                                        [INFO] send message
[INFO] SENT SUCCESFULLY
                                                      [INFO] send message
                                                                                                            [INFO] correct ACK
                                                                                                                                                                        [INFO] correct ACK
[INFO] Mensagem enviada com sucesso para o nó 1
                                                      [INFO] correct ACK
                                                                                                            [DEBUG] Send SYN succesfull
                                                                                                                                                                       [DEBUG] Send SYN succesfull
                                                                                                            [INFO] correct CLOSE
[INFO] waiting for ring to complete
                                                      [DEBUG] Send SYN succesfull
                                                                                                                                                                        [INFO] correct CLOSE
[INFO] received new message
                                                      [INFO] correct CLOSE
                                                                                                            [DEBUG] Send CONTENTS succesfull
                                                                                                                                                                        [DEBUG] Send CONTENTS succesfull
                                                      [DEBUG] Send CONTENTS succesfull
                                                                                                            [INFO] SENT SUCCESFULLY
                                                                                                                                                                        [INFO] SENT SUCCESFULLY
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
                                                      [INFO] SENT SUCCESFULLY
                                                                                                            [INFO] Waiting signal
                                                                                                                                                                        [INFO] Waiting signal
[INFO] Send ack recv msg
                                                      [INFO] Waiting signal
                                                                                                            [INFO] received new message
                                                                                                                                                                        [INFO] received new message
[INFO] Contents received
                                                                                                            [DEBUG] checking if syn
                                                      [INFO] received new message
                                                                                                                                                                       [DEBUG] checking if syn
                                                                                                            [DEBUG] it is syn, loop entered, sending ack
[DEBUG] Sending CLOSE
                                                      [DEBUG] checking if syn
                                                                                                                                                                        [DEBUG] it is syn, loop entered, sending ack
[DEBUG] exiting receive()
                                                       [DEBUG] it is syn, loop entered, sending ack
                                                                                                            [INFO] Send ack recv msg
                                                                                                                                                                        [INFO] Send ack recv msg
                                                       [INFO] Send ack recv msg
[INFO] Ring completed
                                                                                                            [INFO] Contents received
                                                                                                                                                                        [INFO] Contents received
                                                      [INFO] Contents received
                                                                                                            [DEBUG] Sending CLOSE
[INFO] Tentativa de broadcast #1 para o nó 1
                                                                                                                                                                        [DEBUG] Sending CLOSE
[INFO] next node: 1
                                                      [DEBUG] Sending CLOSE
                                                                                                            [DEBUG] exiting receive()
                                                                                                                                                                       [DEBUG] exiting receive()
[INFO] send message
                                                      [DEBUG] exiting receive()
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
                                                                                                            [INFO] RESEND Signal
                                                                                                                                                                       [INFO] RESEND Signal
[DEBUG] Send CONTENTS succesfull
                                                      [INFO] RESEND Signal
                                                                                                            [INFO] send message
                                                                                                                                                                       [INFO] send message
[INFO] SENT SUCCESFULLY
                                                      [INFO] send_message
                                                                                                            [INFO] correct ACK
                                                                                                                                                                        [INFO] correct ACK
[INFO] Mensagem enviada com sucesso para o nó 1
                                                      [INFO] correct ACK
                                                                                                            [DEBUG] Send SYN succesfull
                                                                                                                                                                        [DEBUG] Send SYN succesfull
                                                      [DEBUG] Send SYN succesfull
                                                                                                            [INFO] correct CLOSE
                                                                                                                                                                        [INFO] correct CLOSE
[INFO] waiting for ring to complete
[INFO] received new message
                                                      [INFO] correct CLOSE
                                                                                                            [DEBUG] Send CONTENTS succesfull
                                                                                                                                                                       [DEBUG] Send CONTENTS succesfull
[DEBUG] checking if syn
                                                      [DEBUG] Send CONTENTS succesfull
                                                                                                            [INFO] SENT SUCCESFULLY
                                                                                                                                                                       [INFO] SENT SUCCESFULLY
[DEBUG] it is syn, loop entered, sending ack
                                                      [INFO] SENT SUCCESFULLY
[INFO] Send ack recv msg
INFOl Contents received
                                                                                                            Received message from process 1:
                                                                                                                                                                       Received message from process 2:
[DEBUG] Sending CLOSE
                                                      Received message from process 0:
[DEBUG] exiting receive()
[INFO] Ring completed
Status do envio: 0
Broadcasting message2 -----
[INFO] Tentativa de broadcast #1 para o nó 1
```

# Execução

Status do envio: 0	keceived message trom process 0:	Received message from process 1:	keceived message from process 2:
Broadcasting message2	F.	F.	F.
[INFO] Tentativa de broadcast #1 para o nó 1	i	i	i
[INFO] next_node: 1		T .	r
[INFO] send_message			5
[INFO] correct ACK	t	t	τ
	[mina]	Frure?	Francia I I I
[INFO] correct CLOSE	[INFO] received new message	[INFO] received new message	[INFO] received new message
[DEBUG] Send CONTENTS succesfull	[DEBUG] checking if syn	[DEBUG] checking if syn	[DEBUG] checking if syn
[INFO] SENT SUCCESFULLY	[DEBUG] it is syn, loop entered, sending ack	[DEBUG] it is syn, loop entered, sending ack	[DEBUG] it is syn, loop entered, sending ack
[INFO] Mensagem enviada com sucesso para o nó 1	[INFO] Send ack recv msg	[INFO] Send ack recv msg	[INFO] Send ack recv msg
[INFO] waiting for ring to complete	[INFO] Contents received	[INFO] Contents received	[INFO] Contents received
[INFO] received new message	[DEBUG] Sending CLOSE	[DEBUG] Sending CLOSE	[DEBUG] Sending CLOSE
[DEBUG] checking if syn	[DEBUG] exiting receive()	[DEBUG] exiting receive()	[DEBUG] exiting receive()
[DEBUG] it is syn, loop entered, sending ack	[INFO] AB: Delivering message from node 0	[INFO] AB: Delivering message from node 1	[INFO] AB: Delivering message from node 2
[INFO] Send ack recv msg	[INFO] send_message	[INFO] send_message	[INFO] send_message
[INFO] Contents received	[INFO] correct ACK	[INFO] correct ACK	[INFO] correct ACK
[DEBUG] Sending CLOSE	[DEBUG] Send SYN succesfull	[DEBUG] Send SYN successfull	[DEBUG] Send SYN succesfull
[DEBUG] exiting receive()	[INFO] correct CLOSE	[INFO] correct CLOSE	[INFO] correct CLOSE
[INFO] Ring completed	[DEBUG] Send CONTENTS succesfull	[DEBUG] Send CONTENTS successfull	[DEBUG] Send CONTENTS successfull
[INFO] Tentativa de broadcast #1 para o nó 1	[INFO] SENT SUCCESFULLY	[INFO] SENT SUCCESFULLY	[INFO] SENT SUCCESFULLY
[INFO] next_node: 1	[INFO] Waiting signal	[INFO] Waiting signal	[INFO] Waiting signal
[INFO] send_message	[INFO] received new message	[INFO] received new message	[INFO] received new message
[INFO] correct ACK	[DEBUG] checking if syn	[DEBUG] checking if syn	[DEBUG] checking if syn
[DEBUG] Send SYN succesfull	[DEBUG] it is syn, loop entered, sending ack	[DEBUG] it is syn, loop entered, sending ack	[DEBUG] it is syn, loop entered, sending ack
[INFO] correct CLOSE	[INFO] Send ack recv msg	[INFO] Send ack recv msg	[INFO] Send ack recv msg
[DEBUG] Send CONTENTS succesfull	[INFO] Contents received	[INFO] Contents received	[INFO] Contents received
[INFO] SENT SUCCESFULLY	[DEBUG] Sending CLOSE	[DEBUG] Sending CLOSE	[DEBUG] Sending CLOSE
[INFO] Mensagem enviada com sucesso para o nó 1	[DEBUG] exiting receive()	[DEBUG] exiting receive()	[DEBUG] exiting receive()
[INFO] waiting for ring to complete [INFO] received new message	D E	E	D E
	E		
[DEBUG] checking if syn [DEBUG] it is syn, loop entered, sending ack	[INFO] RESEND Signal	[INFO] RESEND Signal	[INFO] RESEND Signal
[INFO] Send ack recv msg [INFO] Contents received	[INFO] send_message [INFO] correct ACK	[INFO] send_message [INFO] correct ACK	[INFO] send_message
[DEBUG] Sending CLOSE	[DEBUG] Send SYN succesfull	[DEBUG] Send SYN succesfull	[INFO] correct ACK [DEBUG] Send SYN succesfull
[DEBUG] sending CLOSE [DEBUG] exiting receive()	[INFO] correct CLOSE	[INFO] correct CLOSE	[INFO] correct CLOSE
[INFO] Ring completed	[DEBUG] Send CONTENTS succesfull	[DEBUG] Send CONTENTS succesfull	[DEBUG] Send CONTENTS succesfull
Status do envio: 0	[INFO] SENT SUCCESFULLY	[INFO] SENT SUCCESFULLY	[INFO] SENT SUCCESFULLY
luiz@Luiz-Notebook:~/repos/so2\$	[INFO] SENT SUCCESFULLY	[INFO] SENT SUCCESFULLY	[INFO] SENT SUCCESFULLY
luiz@Luiz-Notebook:~/repos/so2\$			
luiz@Luiz-Notebook:~/repos/so2\$	Received message from process 0:	Received message from process 1:	Received message from process 2:
) luiz@Luiz-Notebook:~/repos/so2\$	Received message from process 0:	Received message from process 1:	Received message from process 2:
luiz@Luiz-Notebook:~/repos/so2\$	e	3	
luiz@Luiz-Notebook:~/repos/so2\$	• C	C	
luiz@Luiz-Notebook:~/repos/so2\$		0	
luiz@Luiz-Notebook:~/repos/so2\$	n	n n	n n
luiz@Luiz-Notebook:~/repos/so2\$	d d	ii d	i i
Tuiz@Luiz_Notehook: ~/repos/so2\$	Nil.		

```
int AtomicBroadcastRing::broadcast_ring(const std::vector<uint8_t>& message) {
   int attempt_count = 0;
   const int max_attempts = 3; // Máximo de tentativas
   while (attempt_count < max_attempts) {</pre>
      log("Tentativa de broadcast #" + std::to_string(attempt_count + 1) + " para o nó " + std::to_string(next_node_id));
      log("next_node: " + std::to_string(next_node_id));
       // Tenta enviar a mensagem para o próximo nó
      int result = send(next_node_id, message);
      if (result == 0) {
          log("Mensagem enviada com sucesso para o nó " + std::to_string(next_node_id));
      } else {
          log("Falha ao enviar mensagem na tentativa #" + std::to_string(attempt_count + 1), "WARNING");
          attempt_count++;
   if (attempt_count==max_attempts) {
      log("Exceeded retry amount", "WARNING");
                                                                             int AtomicBroadcastRing::broadcast(const std::vector<uint8 t>& message) {
                                                                                   int status = broadcast_ring(message);
                                                                                  if (status==0) {
   attempt_count = 0;
                                                                                        broadcast ring(std::vector<uint8 t>{'D','E','L'});
   int status = 0;
                                                                                  } else {
                                                                                        broadcast_ring(std::vector<uint8_t>{'N','D','E','L'});
   log("waiting for ring to complete", "INFO");
   while (attempt_count < max_attempts) {</pre>
      Message msg = receive();
                                                                                  return status;
      if (msg.sender_id != -1 && (msg.content==message)) {
          log("Ring completed","INFO");
          break;
       attempt_count++;
   if (attempt_count>=max_attempts) {
      status = -1;
      log("Falha ao entregar a mensagem após " + std::to_string(max_attempts) + " tentativas.", "ERROR");
   return status;
```

```
Message AtomicBroadcastRing::deliver() {
    Message msg = receive();
    // Deliver message to application
    log("AB: Delivering message from node " + std::to_string(msg.sender_id ));
    // Forward the message to the next node in the ring unless it's the sender
    if (msg.sender_id != process_id) {
        send(next_node_id, msg.content);
    int counter = 0;
    int max_tries = 3;
    while (counter < max_tries) {</pre>
        log("Waiting signal","INFO");
        Message signal = receive();
        for (auto byte : signal.content) {
                std::cout << byte << std::endl;</pre>
        if (msg.sender_id != process_id && (signal.content == std::vector<uint8_t>{'D','E','L'} || signal.content==std::vector<uint8_t>{'N','D','E','L'})) {
            log("RESEND Signal");
            send(next_node_id, signal.content);
            break;
        } else {
            counter++;
            log("Wrong signal","WARNING");
    return msg;
```



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