P3 – Comunicação 1:n

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

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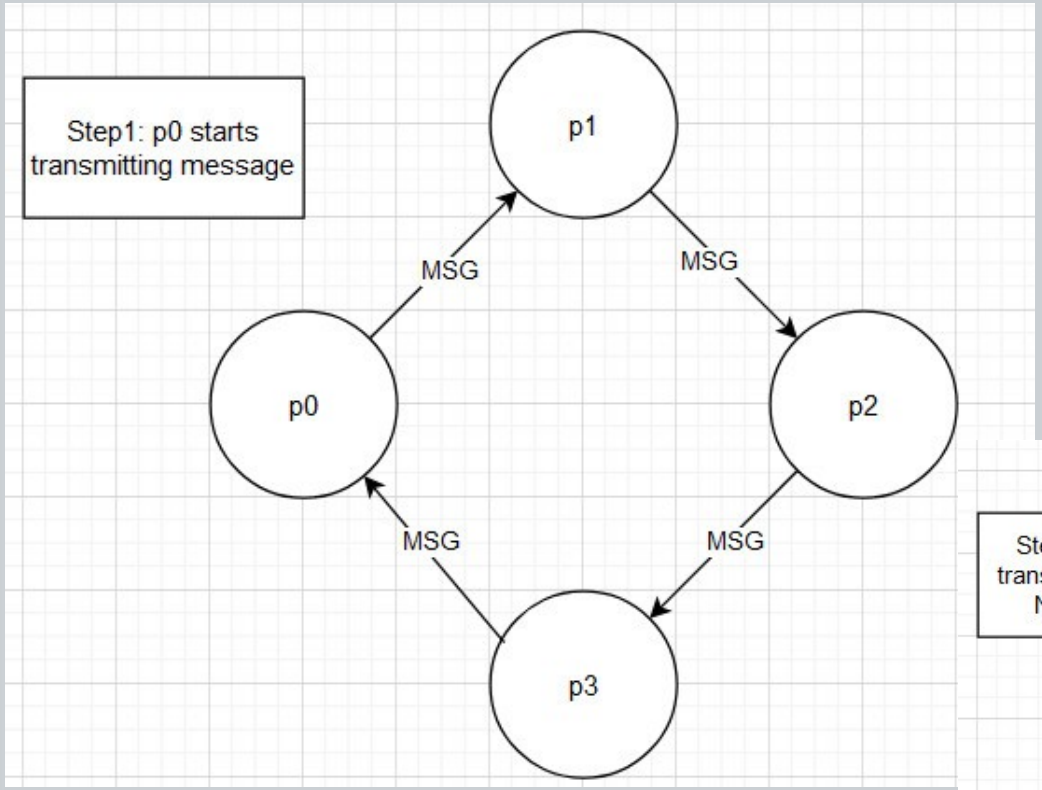
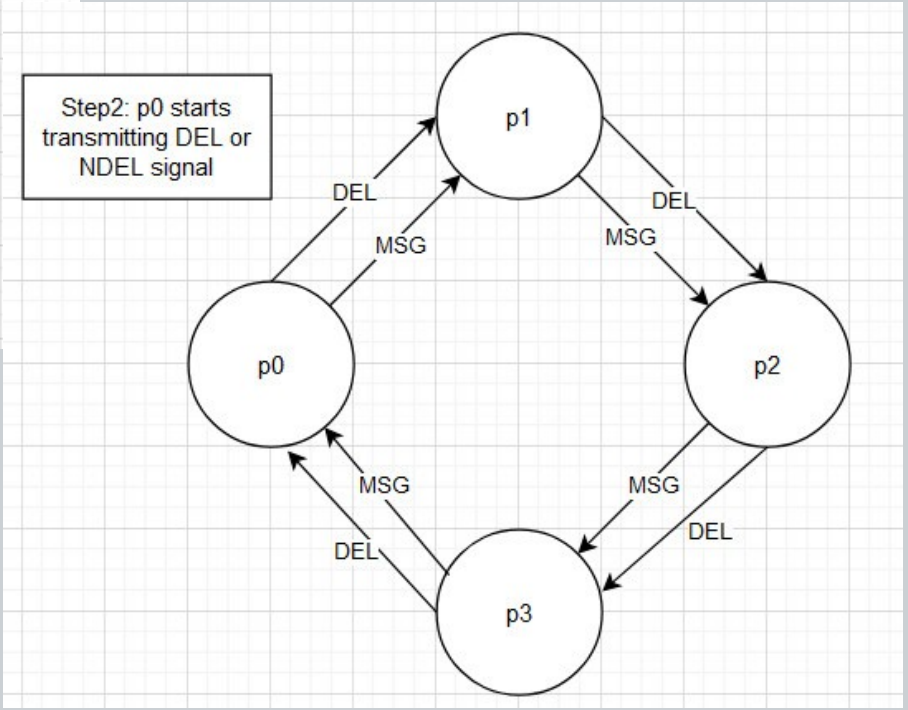
Modificação da arquitetura

- 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





Execução

```
luiz@Luiz-Notebook:~/repos/so2$ ./my_project 0 A B
----- Executando Atomic Broadcast -----
Broadcasting message1 -----
[INFO] Tentativa de broadcast #1 para o nó 1
[INFO] next_node: 1
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Mensagem enviada com sucesso para o nó 1
[INFO] waiting for ring to complete
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] Ring completed
[INFO] Tentativa de broadcast #1 para o nó 1
[INFO] next_node: 1
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Mensagem enviada com sucesso para o nó 1
[INFO] waiting for ring to complete
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] Ring completed
Status do envio: 0
Broadcasting message2 -----
[INFO] Tentativa de broadcast #1 para o nó 1
```

```
luiz@Luiz-Notebook:~/repos/so2$ ./my_project 1 A B
----- Executando Atomic Broadcast -----
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] AB: Delivering message from node 0
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Waiting signal
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
D
E
L
[INFO] RESEND Signal
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY


Received message from process 0:
F
i
r
s
t
```

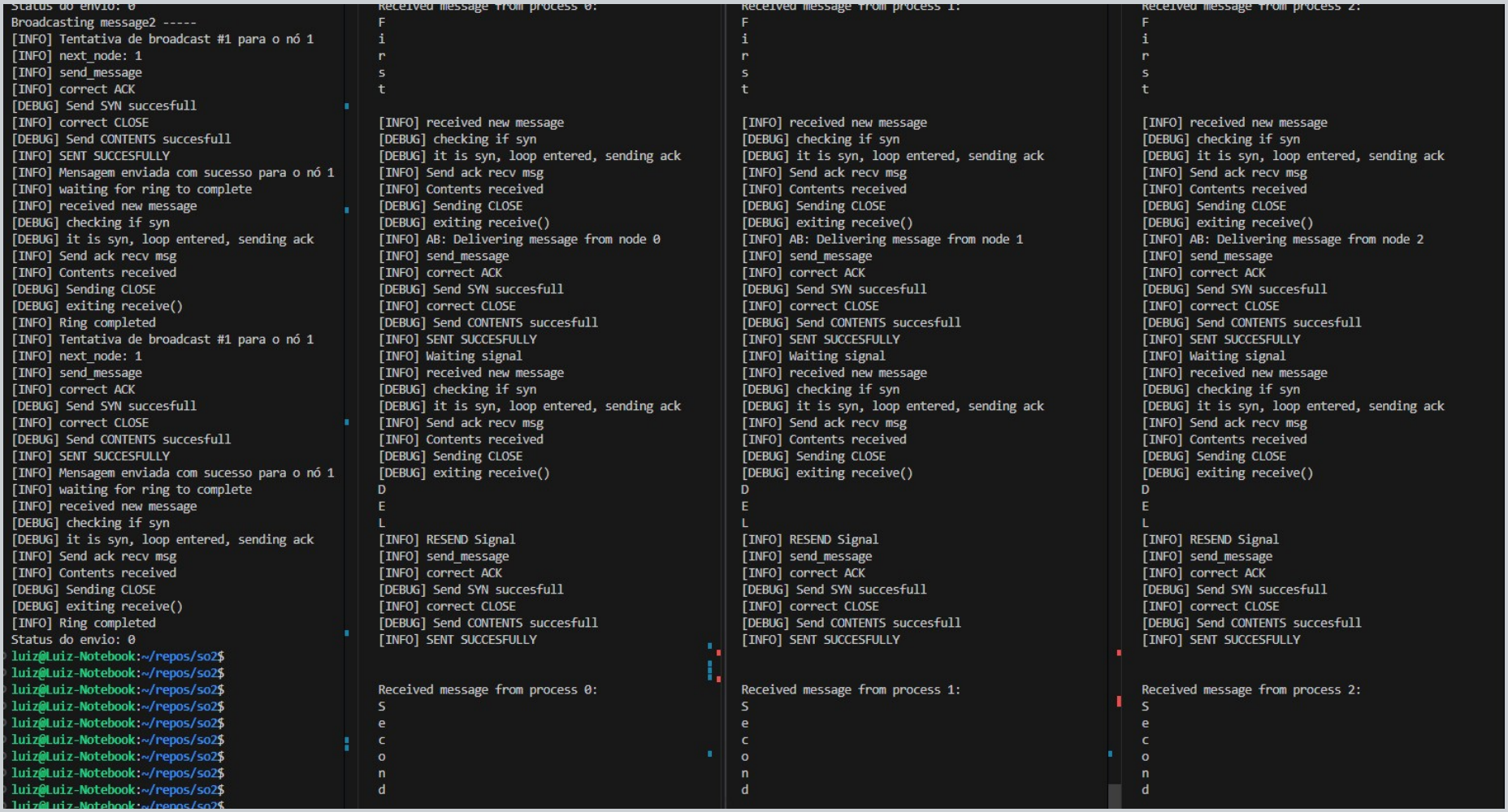
```
luiz@Luiz-Notebook:~/repos/so2$ ./my_project 2 AB
----- Executando Atomic Broadcast -----
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] AB: Delivering message from node 1
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Waiting signal
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
D
E
L
[INFO] RESEND Signal
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY


Received message from process 1:
F
i
r
s
t
```

```
luiz@Luiz-Notebook:~/repos/so2$ ./my_project 3 AB
----- Executando Atomic Broadcast -----
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] AB: Delivering message from node 2
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Waiting signal
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
D
E
L
[INFO] RESEND Signal
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY


Received message from process 2:
F
i
r
s
t
```

Execução


Status do envio: 0
Broadcasting message2 -----
[INFO] Tentativa de broadcast #1 para o nó 1
[INFO] next_node: 1
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Mensagem enviada com sucesso para o nó 1
[INFO] waiting for ring to complete
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] Ring completed
[INFO] Tentativa de broadcast #1 para o nó 1
[INFO] next_node: 1
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Mensagem enviada com sucesso para o nó 1
[INFO] waiting for ring to complete
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] Ring completed
Status do envio: 0
luiz@Luiz-Notebook:~/repos/so2$
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luiz@Luiz-Notebook:~/repos/so2$
luiz@Luiz-Notebook:~/repos/so2$
luiz@Luiz-Notebook:~/repos/so2$
luiz@Luiz-Notebook:~/repos/so2$
luiz@Luiz-Notebook:~/repos/so2$
Received message from process 0:
F
i
r
s
t
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] AB: Delivering message from node 0
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Waiting signal
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
D
E
L
[INFO] RESEND Signal
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
Received message from process 0:
S
e
c
o
n
d
Received message from process 1:
F
i
r
s
t
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] AB: Delivering message from node 1
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Waiting signal
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
D
E
L
[INFO] RESEND Signal
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
Received message from process 1:
S
e
c
o
n
d
Received message from process 2:
F
i
r
s
t
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
[INFO] AB: Delivering message from node 2
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
[INFO] Waiting signal
[INFO] received new message
[DEBUG] checking if syn
[DEBUG] it is syn, loop entered, sending ack
[INFO] Send ack recv msg
[INFO] Contents received
[DEBUG] Sending CLOSE
[DEBUG] exiting receive()
D
E
L
[INFO] RESEND Signal
[INFO] send_message
[INFO] correct ACK
[DEBUG] Send SYN succesfull
[INFO] correct CLOSE
[DEBUG] Send CONTENTS succesfull
[INFO] SENT SUCCESFULLY
Received message from process 2:
S
e
c
o
n
d

```cpp
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) {
        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));
            break;
        } 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");
        return -1;
    }

    attempt_count = 0;

    int status = 0;

    log("waiting for ring to complete", "INFO");
    while (attempt_count < max_attempts) {
        Message msg = receive();
        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;
}
```

```cpp
int AtomicBroadcastRing::broadcast(const std::vector<uint8_t>& message) {
    int status = broadcast_ring(message);
    if (status==0) {
        broadcast_ring(std::vector<uint8_t>{'D','E','L'});
    } else {
        broadcast_ring(std::vector<uint8_t>{'N','D','E','L'});
    }
    return status;
}
```

```cpp
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) {
        log("Waiting signal","INFO");
        Message signal = receive();

        for (auto byte : signal.content) {
                std::cout << byte << std::endl;
            }

        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;
}
```

Equipe

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