**MC514**

**Sistemas Operacionais:**

**Teoria e Prática**

1s2006

# Comunicação Interprocessos

# Troca de mensagens

- Primitivas para estabelecimento do canal e envio e recepção de mensagens
- Primitivas bloqueantes e não bloqueantes
- Problemas análogos em processos distribuídos

# msgget()

```
msqid = msgget (key_t key, int msgflg);
```

- `key`: an integer usually got from `ftok()` or `IPC_PRIVATE`.
- `msgflg`:
  - `IPC_CREAT`: used to create a new resource if it does not already exist.
  - `IPC_EXCL | IPC_CREAT`: used to ensure failure of the call if the resource already exists.
  - `rwxrwxrwx`: access permissions.
- returns: msqid (an integer used for all further access) on success. -1 on failure.

# Buffer

```
struct msgbuf {
  long mtype;       /* message type */
  char mtext[1];    /* message data */
};
```

- `mtype`: indica o tipo de mensagem
- `mtext`: vetor ou estrutura

# msgsnd()

```
int msgsnd (int msqid, struct msgbuf *msgp,
            int msgsz, int msgflg);
```

- `msqid`: id obtained by a call to msgget.
- `msgsz`: size of msg text (`mtext`) in bytes.
- `msgp`: message to be sent. (msgp->mtype must be positive).
- `msgflg`: `IPC_NOWAIT`.
- returns: `msgsz` on success. -1 on error.

# msgrcv()

```
int msgrcv (int msqid, struct msgbuf *msgp,
            int msgsz, long msgtyp, int msgflg);
```

- msqid: id obtained by a call to msgget.
- msgsz: maximum size of message to receive.
- msgp: allocated by user to store the message in.

# msgrcv()

```
int msgrcv (int msqid, struct msgbuf *msgp,
            int msgsz, long msgtyp, int msgflg);
```

- msgtyp:

  $= 0 \Rightarrow$ get first message on queue.

  $> 0 \Rightarrow$ get first message of matching type.

  $< 0 \Rightarrow$ get message with least type which is $\leq$ abs(msgtyp).

# msgrcv()

```
int msgrcv (int msqid, struct msgbuf *msgp,
            int msgsz, long msgtyp, int msgflg);
```

- msgflg:
  - `IPC_NOWAIT`: Return immediately if message not found.
  - `MSG_NOERROR`: The message is truncated if it is larger than msgsz.
  - `MSG_EXCEPT`: Used with msgtyp $> 0$ to receive any msg except of specified type.
- returns : size of message if found. -1 on error.

# Monitor

```
monitor example
  integer i;
  condition c;

  procedure producer();
  end;

  procedure consumer();
  end;
end monitor;
```

# Monitor Produtor-Consumidor

```
monitor ProducerConsumer
    condition full, empty;
    integer count;

    procedure insert(item: integer);
    begin
       if count = N then wait(full);
       insert_item(item);
       count := count + 1;
       if count = 1 then signal(empty);
    end;
```

# Monitor Produtor-Consumidor

```
    function remove: integer;
    begin
      if count = 0 the wait(empty);
      remove := remove_item;
      count := count - 1;
      if count = N - 1 then signal(full);

end monitor;
```

# Produtor-Consumidor em Java

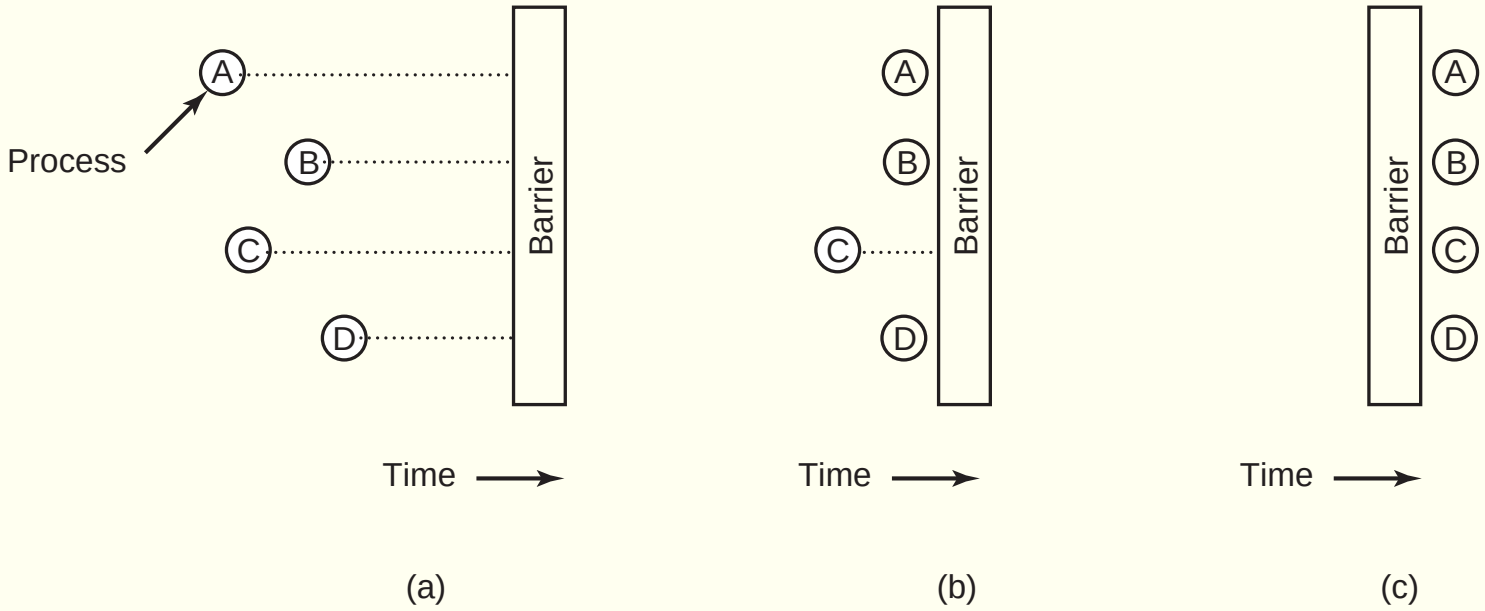
```
static class our_monitor {
  private int buffer[] = new int[N];
  private int count = 0, lo = 0, hi = 0;

  public synchronized void insert(int val) {
    if (count == N) go_to_sleep();
    buffer[hi] = val;
    hi = (hi + 1) % N;
    count = count + 1;
    if (count == 1) notify();
  }
```

# Produtor-Consumidor em Java

```
public synchronized int remove() {
    int val;
      if (count == 0) go_to_sleep();
      val = buffer[lo];
      lo = (lo + 1) % N;
      count = count - 1;
      if (count == N - 1) notify();
      return val;
    }
   private void go_to_sleep()
   {try{wait();} catch(InterruptException exc){};}
}
```

# Barreiras




- Programação baseada em passos