STR: aula_6

Trabalho 1 – 2ª parte

RTLib – A realtime kernel library

Planeamento das aulas

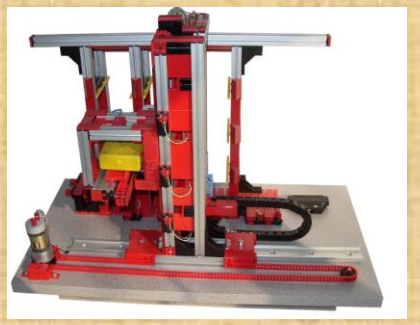
- **Semana 21 Set:**
  - **Conceitos básicos de I/O (com experimentação)**
- **Semanas 28 Set, (5 Out), 12 Out:**
  - **1ª parte do trabalho 1 (em C)**
- **Semanas 19 Out, 26 Out:**
  - **2ª parte do trabalho 1 (RTlib)**  **HERE**
- **Semana 2 Nov:**
  - **Exercícios sobre Java**
- **Semanas 9, 16, 23 Nov:**
  - **Trabalho 2: Java em Tempo Real**
- **Semanas 30 Nov, 7 Dez, 14 Dez:**
  - **Trabalho 3 (plc)**

Access to critical resources

Why

- **There are resources which require EXCLUSIVE ACCESS**
- **There are resources which can be shared for reading, but**
- **require exclusive access for writing…**

IDENTIFY WHICH ISSUES REQUIRE EXCLUSIVE ACCESS IN THESE SYSTEMS:



Access to critical resources

How to handle

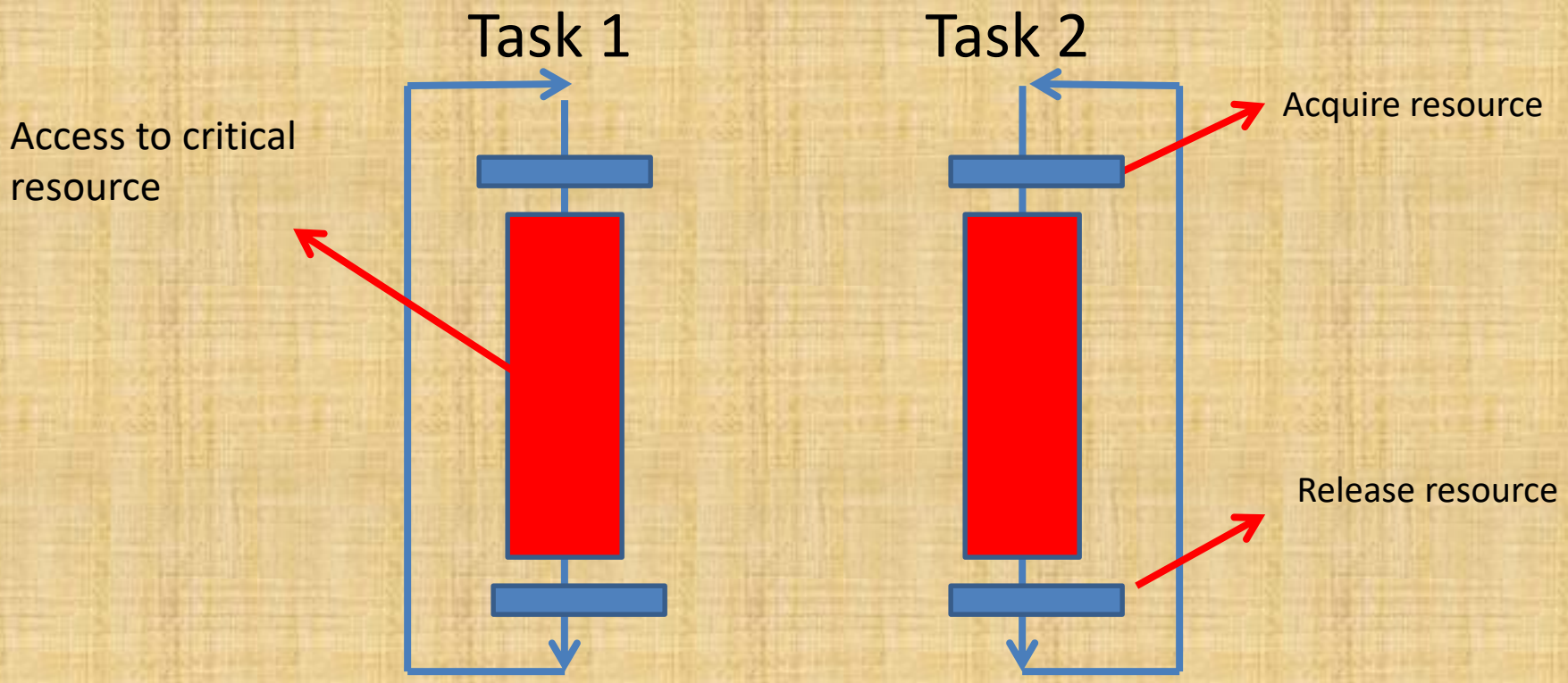
- **Define a semaphore for exclusive access**

```
// the second argument defines the number of resources available
// OR number of simultaneous accesses allowed
S3=RTcreateSemaphore(COUNT,1,"S3");
```

- **Perform RTwait(S3) just before using the resource**

- **Perform Rtsignal(S3) just after using the resource (so that other tasks can use it)**

How it works


Task 1
Task 2
Access to critical resource
Acquire resource
Release resource

Example: Exclusive access to keyboard

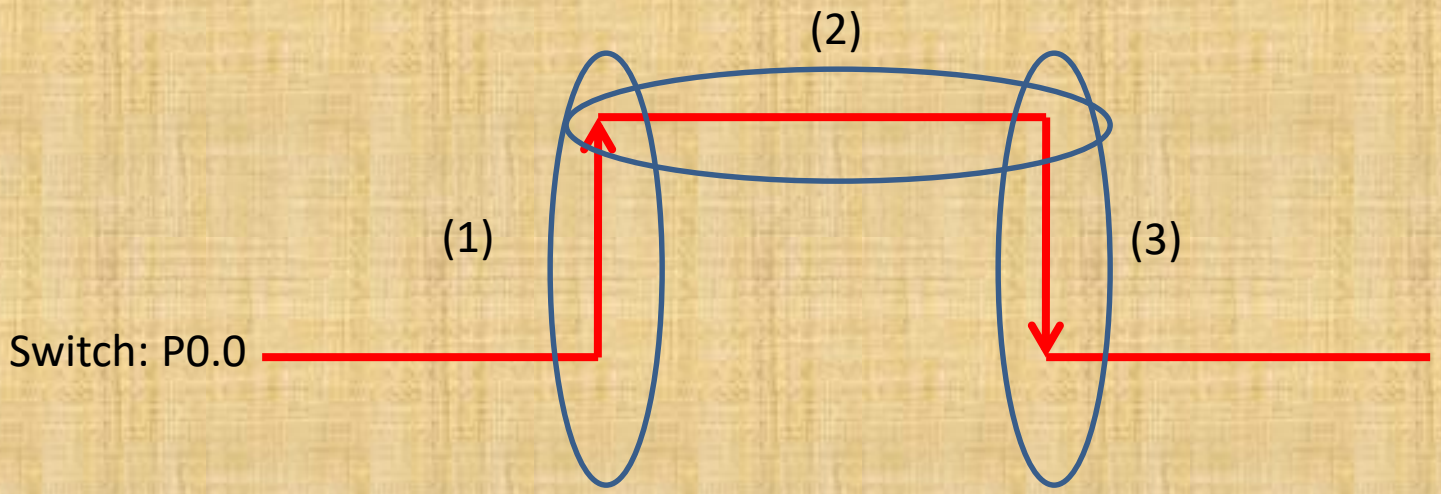
```
RTtask(Task1)
{
    while ( true )
   {
      char str[256]= "";
       // other code before
       RTwait(S3);
      printf( "\nTask1 str=");
      RTgets(str);
      printf( "\nTask1 got string=%s", str);
          if(str[0]==27)
                terminate_prog=true;
      RTsignal(S3);
      // other code after….
   }
}
```

```
RTtask(Task2)
{
    while ( true )
   {
      char str[256]= "";
       RTwait(S3);
      printf( "\nTask2 str=");
      RTgets(str);
      printf( "\nTask2 got string=%s", str);
          if(str[0]==27)
                terminate_prog=true;
      RTsignal(S3);
   }
}
```

Try it here…. → C:\rtlib\demos\vc++6\critical_resource

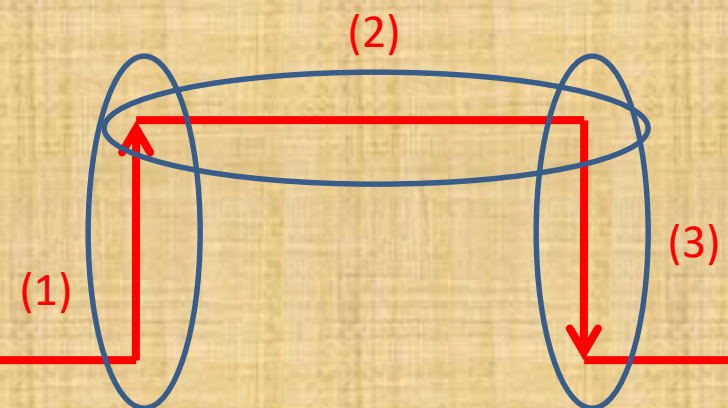
Events versus states

(1) Detecting change from “zero” to “one”
(2) Reading the states
(3) Detecting change from “one” to “zero”



How to detect events

```
RTtask(task1)
{
  int P00_preve=0;
  int P00_curr=0;
  While(true)
  {
      P00_curr= in_port(0) & (1<<0); // read state of  bit 0 of port 0   (2)
      if(P00_curr && ! P00_prev){
          // p00 has been changed to “one” (1)
          //….
      }
      if(!P00_curr &&  P00_prev){
          // p00 has been changed to “zero” (3)
          //…..
      }
     //IMPORTANT:
     P00_prev = P00_curr; // save current_state as previous_state
     RTdelay(1)
  }
```



Several messages in a mailbox

The problem is that a mailbox only stores the address of the records

```
// sending a message
TRequest req = new TRequest();
req->x=0;
req->z=0;
req->op=PUT;
Rtput(mbx1, req);
```

```
// Receiving a message
TRequest *req = (Trequest *)RTget(mbx1);
// handle the request
//goto_xz(…);
//put_piece(..)…
delete(req);
```

```
// Emptying a mailbox
Int success;
do {
    RTgetTimed(mbx1,1,success);  // RTgetTimed(mBox,timeout,success)
} while(success);
```