

Monitors and One-Way Bridges -- !!non-exclusion!!

```
monitor Bridge {  
  
    cond northbound, southbound; // conds are waiting stations  
    int northOnBridge, southOnBridge;  
  
    procedure enterSouthbound( ) {  
  
        if (northOnBridge>0)  
            wait(southbound);  
  
        southOnBridge++;  
  
    }  
  
    procedure leaveSouthbound( ) {  
  
        southOnBridge--;  
  
        if (southOnBridge==0)  
            signal_all(northbound);  
  
    }  
  
    // + northbound versions  
  
    // note: the bridge crossing is not in monitor  
}
```

Monitors and One-Way Bridges -- !!impolite!!

```
monitor Bridge {  
  
    cond northbound, southbound;  
    int northOnBridge, southOnBridge;  
  
    procedure enterSouthbound( ) {  
  
        while (northOnBridge>0)  
            wait(southbound);  
  
        southOnBridge++;  
  
    }  
  
    procedure leaveSouthbound( ) {  
  
        southOnBridge--;  
  
        if (southOnBridge==0)  
            signal_all(northbound);  
  
    }  
  
    // + northbound versions  
  
    // note: the bridge crossing is not in monitor  
}
```

Monitors and One-Way Bridges – !!Oops accident again!!

```
monitor Bridge {  
  
    cond northbound, southbound;  
    int northOnBridge, southOnBridge;  
  
    procedure enterSouthbound( ) {  
        if ((northOnBridge>0) || !empty(northbound))  
            wait(southbound);  
  
        southOnBridge++;  
    }  
  
    procedure leaveSouthbound( ) {  
        southOnBridge--;  
  
        if (southOnBridge==0)  
            signal_all(northbound);  
    }  
  
    // + northbound versions  
  
    // note: the bridge crossing is not in monitor  
}
```

Monitors and One-Way Bridges -- !!too polite -- deadlock!!

```
monitor Bridge {  
  
    cond northbound, southbound;  
    int northOnBridge, southOnBridge;  
  
    procedure enterSouthbound( ) {  
        while ((northOnBridge>0) || !empty(northbound))  
            wait(southbound);  
  
        southOnBridge++;  
    }  
  
    procedure leaveSouthbound( ) {  
        southOnBridge--;  
  
        if (southOnBridge==0)  
            signal_all(northbound);  
    }  
  
    // + northbound versions  
    // note: the bridge crossing is not in monitor  
}
```

Monitors and One-Way Bridges -- ??just right??

```
monitor Bridge {  
  
    cond northbound, southbound;  
    int northOnBridge, southOnBridge;  
  
    procedure enterSouthbound( ) {  
  
        while ((northOnBridge>0) ||  
              ((southOnBridge>0) && !empty(northbound)))  
            wait(southbound);  
  
        southOnBridge++;  
    }  
  
    procedure leaveSouthbound( ) {  
  
        southOnBridge--;  
  
        if (southOnBridge==0)  
            signal_all(northbound);  
    }  
  
    // + northbound versions  
    // note: the bridge crossing is not in monitor  
}
```

Monitors and One-Way Bridges -- ??better??

```
monitor Bridge {  
  
    cond northbound, southbound;  
    int northOnBridge, southOnBridge;  
  
    procedure enterSouthbound( ) {  
  
        if ((northOnBridge>0) || !empty(northbound))  
            wait(southbound);  
  
        while (northOnBridge>0)  
            wait(southbound);  
  
        southOnBridge++;  
    }  
  
    procedure leaveSouthbound( ) {  
        southOnBridge--;  
        if (southOnBridge==0) signal_all(northbound);  
    }  
  
    // + northbound versions  
    // note: the bridge crossing is not in monitor  
}
```