

The Cigarette-Smokers Problem

- There are four processes in this problem: three smoker processes and an agent process.
- Each of the smoker processes continuously rolls a cigarette and then smokes it.
- To make a cigarette smoker process needs three ingredients: tobacco, paper, and matches.
- Each smoker process has one of the three items. i.e., one process has tobacco, another has paper, and a third has matches.
- The agent has an infinite supply of all three materials.
- The agent places two of the three ingredients on the table, and the smoker that has the remaining ingredient makes and smokes the cigarette. It also signals the agent on completion.
- The agent then puts out another two of the three ingredients, and the cycle repeats.
- If they can't make a cigarette, then they will go to sleep. The agent process will place two items on the table, and wake up the appropriate smoker, and then go to sleep.

Solution (Semaphore)

Shared data

```
semaphore TobaccoAndPaper;  
semaphore PaperAndMatch;  
semaphore MatchAndTobacco;  
semaphore smoke;
```

Initially

```
TobaccoAndPaper=0;  
PaperAndMatch=0;  
MatchAndTobacco=0;  
smoke=1;                (1 represents no smoking and 0 represents smoking)
```

Structure of Agent

```
do  
{  
    wait (smoke);          //Agent will sleep when smoke=0  
    int r=rand()%3;        //Generate random numbers between 0 to 2  
    if(r==0)  
        signal (TobaccoAndPaper);  
    elseif(r==1)  
        signal (PaperAndMatch);  
    else  
        signal (MatchAndTobacco);  
} while (true);
```

Structure of Smoker_A

```
do
{
    wait (TobaccoAndPaper);    //waiting for the TobaccoAndPaper
    // Roll cigarette
    //Smoke cigarette
    signal (smoke);
} while (true);
```

Structure of Smoker_B

```
do
{
    wait (PaperAndMatch);      //waiting for the PaperAndMatch
    //Roll cigarette
    //Smoke cigarette
    signal (smoke);
} while (true);
```

Structure of Smoker_C

```
do
{
    wait (MatchAndTobacco);    //waiting for the MatchAndTobacco

    //Roll cigarette
    //Smoke cigarette
    signal (smoke);
} while (true);
```