**DA-IICT**



IT 215 PROJECT

**Winter Semester**

**(2011-2012)**

**Submitted To:**

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**Goal:** To simulate process automation for a manufacturing plant.

**Problem Statement:**

Assume that there is a manufacturing plant, which manufactures finished products based on processing on raw materials. There are few machines in the plant. Each machine inputs raw materials, performs processing and produces semi-finished product, which is supplied as input or raw material to another machine. Thus, there is a chain of machines which are involved in the process inputting raw materials or semi-finished product and produces semi-finished product. Finally finished product will be the final output. Each machine is to be simulated as a process. Various processes can be initiated independently of each other and executed in background. Each process may take input from a specific named pipe and write output as a processed semi-finished product on some other named pipe. Define the sequence of actions among 5-7 such machines, define the flow input and output among them. One machine should be identified as a machine, which generates finished product, i.e. gray cloth.Each machine operates under certain environmental conditions, i.e. machine should be operated within the range of temperature. If temperature level of any of the machine is more than the upper limit then it should generate signal and send it to the main controlling machine, which will inform all other machines to stop operations.

**Programing Language, Tool, Library used:**

* Programming language used was “C”.
* Basic Linux environment was used with its various tools like gedit, terminal, etc. to develop and test program modules.
* Libraries included are pthread, signal and rest are mentioned header.h file included in each module.

**List of Program Developed:**

* main.c
* p1.c
* p2.c
* p3.c
* p4.c

Now we will discuss about each process:

**Main Process:**

In this process we will take our input as raw materials from the user. All the input variables are shared with the help of shared memory.

This process will provide us with three cases: one is changing the data of raw materials, second to take the temp of 1st machine, third is power failure.

In this first we have read the process id’s of the four processes using fifo, and then passed its own id to all the four processes.

It will contain the signal handlers which the four processes will need.

We have also used concept of semaphore, but have implanted lock using a shared variable so that the shared memory block can be lock.

**P1 Process:**

In this process the iron body of car is formed. This process will be forming three threads and this will run as infinite loop until the raw material is finished or power failure or temp., shoot-up takes place. This process sends signal to next process that he is sending the iron body which is created. And also sends signal to main process whenever it wants to exit.

**P2 Process:**

In this process the car will be painted. This will form two threads. These threads will also run infinitely until the process wants to exit. And the same concepts are also used in this as the p1 process.

**P3 Process:**

In this process the car enters the glass factory where all the mirrors are formed. Then the car is passed on to the next process using signal.

**P4 Process:**

This is the process where assembling of different car processes take place. This process also gives us the final finished car.

**Key Points:**

* **Key concepts: threads, signals, pipe using fifo, shared memory, concept of locking.**
* Firstly we have assumed that during the starting of all the processes , the processes should be started in order, i.e. first the main process, then p1, p2, p3 and p4.
* If there are output of some process more than the next process can utilise than these could be reuse when the process is again started afterwards.
* If some raw material is fully used during an ongoing process than we can add the raw material during the working of that process.
* During the temp. Increase of one process we have not shutdown other processes as the shutdown of that process wouldn’t affect the other process much, or the other process will perform the task uptil then that they now want the process that have been shut down.
* And we cant stop any process in between and then restart it.
* All the process are implemented using different files named as above.

Now on next page we have given a flowchart to understand our project:

And we have also shown running of code for the three cases discuss in main process in input-output file.

**Shared mem.**

**SIGNAL &**

**Pipes**

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**Flowchart layout of our factory**

**OUTPUT**: CAR

**INPUT**: Raw Material

**Process P1**

**Process P2**

**MAIN PROCESS**

**Process P4**

**Process P3**