**1.BANKERS ALGORITHM:**

**#include <stdio.h>**

**int main() {**

**int n, m, i, j, k;**

**printf("Enter the number of processes: ");**

**scanf("%d", &n);**

**printf("Enter the number of resources: ");**

**scanf("%d", &m);**

**int alloc[n][m], max[n][m], avail[m];**

**printf("Enter the Allocation Matrix:\n");**

**for (i = 0; i< n; i++) {**

**for (j = 0; j < m; j++) {**

**scanf("%d", &alloc[i][j]);**

**}**

**}**

**printf("Enter the MAX Matrix:\n");**

**for (i = 0; i< n; i++) {**

**for (j = 0; j < m; j++) {**

**scanf("%d", &max[i][j]);**

**}**

**}**

**printf("Enter the Available Resources:\n");**

**for (j = 0; j < m; j++) {**

**scanf("%d", &avail[j]);**

**}**

**int f[n], ans[n], ind = 0;**

**for (k = 0; k < n; k++) {**

**f[k] = 0;**

**}**

**int need[n][m];**

**for (i = 0; i< n; i++) {**

**for (j = 0; j < m; j++)**

**need[i][j] = max[i][j] - alloc[i][j];**

**}**

**int y = 0;**

**for (k = 0; k < n; k++) {**

**for (i = 0; i< n; i++) {**

**if (f[i] == 0) {**

**int flag = 0;**

**for (j = 0; j < m; j++) {**

**if (need[i][j] > avail[j]) {**

**flag = 1;**

**break;**

**}**

**}**

**if (flag == 0) {**

**ans[ind++] = i;**

**for (y = 0; y < m; y++)**

**avail[y] += alloc[i][y];**

**f[i] = 1;**

**}**

**}**

**}**

**}**

**int flag = 1;**

**for (i = 0; i< n; i++) {**

**if (f[i] == 0) {**

**flag = 0;**

**break;**

**}**

**}**

**if (flag == 0) {**

**printf("The following system is not safe\n");**

**} else {**

**printf("Following is the SAFE Sequence\n");**

**for (i = 0; i< n - 1; i++)**

**printf(" P%d ->", ans[i]);**

**printf(" P%d", ans[n - 1]);**

**}**

**return 0;**

**}**

**Output:**

Enter the number of processes: 5

Enter the number of resources: 3

Enter the Allocation Matrix:

0 1 0

2 0 0

3 0 2

2 1 1

0 0 2

Enter the MAX Matrix:

7 5 3

3 2 2

9 0 2

2 2 2

4 3 3

Enter the Available Resources:

3 3 2

Following is the SAFE Sequence

P1 -> P3 -> P4 -> P0 -> P2

**2a.FIRST FIT:**

**#include <stdio.h>**

**void firstFit(int blockSize[], int m, int processSize[], int n) {**

**int allocation[n];**

**for (int i = 0; i< n; i++)**

**allocation[i] = -1;**

**for (int i = 0; i< n; i++) {**

**for (int j = 0; j < m; j++) {**

**if (blockSize[j] >= processSize[i]) {**

**allocation[i] = j;**

**blockSize[j] -= processSize[i];**

**break;**

**}**

**}**

**}**

**printf("\nFirst Fit Allocation:\n");**

**printf("Process No.\tProcess Size\tBlock No.\n");**

**for (int i = 0; i< n; i++) {**

**printf(" %d \t\t %d \t\t", i+1, processSize[i]);**

**if (allocation[i] != -1)**

**printf("%d\n", allocation[i] + 1);**

**else**

**printf("Not Allocated\n");**

**}**

**}**

**int main() {**

**int m, n;**

**printf("Enter the number of memory blocks: ");**

**scanf("%d", &m);**

**int blockSize[m];**

**printf("Enter the size of each memory block:\n");**

**for (int i = 0; i< m; i++) {**

**printf("Block %d: ", i+1);**

**scanf("%d", &blockSize[i]);**

**}**

**printf("\nEnter the number of processes: ");**

**scanf("%d", &n);**

**int processSize[n];**

**printf("Enter the size of each process:\n");**

**for (int i = 0; i< n; i++) {**

**printf("Process %d: ", i+1);**

**scanf("%d", &processSize[i]);**

**}**

**firstFit(blockSize, m, processSize, n);**

**return 0;**

**}**

**Output:**

**Enter the number of memory blocks: 5**

**Enter the size of each memory block:**

**Block 1: 100**

**Block 2: 500**

**Block 3: 200**

**Block 4: 300**

**Block 5: 600**

**Enter the number of processes: 4**

**Enter the size of each process:**

**Process 1: 212**

**Process 2: 417**

**Process 3: 112**

**Process 4: 426**

**First Fit Allocation:**

**Process No. Process Size Block No.**

**1 212 2**

**2 417 5**

**3 112 2**

**4 426 Not Allocated**

**2b.BEST FIT:**

**#include <stdio.h>**

**void bestFit(int blockSize[], int m, int processSize[], int n) {**

**int allocation[n];**

**for (int i = 0; i< n; i++)**

**allocation[i] = -1;**

**for (int i = 0; i< n; i++) {**

**int bestIdx = -1;**

**for (int j = 0; j < m; j++) {**

**if (blockSize[j] >= processSize[i]) {**

**if (bestIdx == -1 || blockSize[j] <blockSize[bestIdx])**

**bestIdx = j;**

**}**

**}**

**if (bestIdx != -1) {**

**allocation[i] = bestIdx;**

**blockSize[bestIdx] -= processSize[i];**

**}**

**}**

**printf("\nBest Fit Allocation:\n");**

**printf("Process No.\tProcess Size\tBlock No.\n");**

**for (int i = 0; i< n; i++) {**

**printf(" %d \t\t %d \t\t", i+1, processSize[i]);**

**if (allocation[i] != -1)**

**printf("%d\n", allocation[i] + 1);**

**else**

**printf("Not Allocated\n");**

**}**

**}**

**int main() {**

**int m, n;**

**printf("Enter the number of memory blocks: ");**

**scanf("%d", &m);**

**int blockSize[m];**

**printf("Enter the size of each memory block:\n");**

**for (int i = 0; i< m; i++) {**

**printf("Block %d: ", i+1);**

**scanf("%d", &blockSize[i]);**

**}**

**printf("\nEnter the number of processes: ");**

**scanf("%d", &n);**

**int processSize[n];**

**printf("Enter the size of each process:\n");**

**for (int i = 0; i< n; i++) {**

**printf("Process %d: ", i+1);**

**scanf("%d", &processSize[i]);**

**}**

**bestFit(blockSize, m, processSize, n);**

**return 0;**

**}**

**Output:**

**Enter the number of memory blocks: 5**

**Enter the size of each memory block:**

**Block 1: 100**

**Block 2: 500**

**Block 3: 200**

**Block 4: 300**

**Block 5: 600**

**Enter the number of processes: 4**

**Enter the size of each process:**

**Process 1: 212**

**Process 2: 417**

**Process 3: 112**

**Process 4: 426**

**Best Fit Allocation:**

**Process No. Process Size Block No.**

**1 212 4**

**2 417 2**

**3 112 3**

**4 426 5**

**2c.WORST FIT**

**#include <stdio.h>**

**void worstFit(int blockSize[], int m, int processSize[], int n) {**

**int allocation[n];**

**for (int i = 0; i< n; i++)**

**allocation[i] = -1;**

**for (int i = 0; i< n; i++) {**

**int worstIdx = -1;**

**for (int j = 0; j < m; j++) {**

**if (blockSize[j] >= processSize[i]) {**

**if (worstIdx == -1 || blockSize[j] >blockSize[worstIdx])**

**worstIdx = j;**

**}**

**}**

**if (worstIdx != -1) {**

**allocation[i] = worstIdx;**

**blockSize[worstIdx] -= processSize[i];**

**}**

**}**

**printf("\nWorst Fit Allocation:\n");**

**printf("Process No.\tProcess Size\tBlock No.\n");**

**for (int i = 0; i< n; i++) {**

**printf(" %d \t\t %d \t\t", i+1, processSize[i]);**

**if (allocation[i] != -1)**

**printf("%d\n", allocation[i] + 1);**

**else**

**printf("Not Allocated\n");**

**}**

**}**

**int main() {**

**int m, n;**

**printf("Enter the number of memory blocks: ");**

**scanf("%d", &m);**

**int blockSize[m];**

**printf("Enter the size of each memory block:\n");**

**for (int i = 0; i< m; i++) {**

**printf("Block %d: ", i+1);**

**scanf("%d", &blockSize[i]);**

**}**

**printf("\nEnter the number of processes: ");**

**scanf("%d", &n);**

**int processSize[n];**

**printf("Enter the size of each process:\n");**

**for (int i = 0; i< n; i++) {**

**printf("Process %d: ", i+1);**

**scanf("%d", &processSize[i]);**

**}**

**worstFit(blockSize, m, processSize, n);**

**return 0;**

**}**

**Enter the number of memory blocks: 5**

**Enter the size of each memory block:**

**Block 1: 100**

**Block 2: 500**

**Block 3: 200**

**Block 4: 300**

**Block 5: 600**

**Enter the number of processes: 4**

**Enter the size of each process:**

**Process 1: 212**

**Process 2: 417**

**Process 3: 112**

**Process 4: 426**

**Worst Fit Allocation:**

**Process No. Process Size Block No.**

**1 212 5**

**2 417 2**

**3 112 5**

**4 426 Not Allocated**

**3.Producer consumer problem**

**Filename ProducerConsumerExample.java**

**import java.util.LinkedList;**

**import java.util.Queue;**

**import java.util.Scanner;**

**// Class representing the bounded buffer**

**class BoundedBuffer {**

**private final int capacity;**

**private final Queue<Integer>queue;**

**public BoundedBuffer(int capacity) {**

**this.capacity = capacity;**

**this.queue = new LinkedList<>();**

**}**

**// Method to produce an item**

**public synchronized void produce(int value) throws InterruptedException {**

**while (queue.size() == capacity) {**

**System.out.println("Buffer is full. Producer is waiting...");**

**wait();//System.exit(0);**

**}**

**queue.add(value);**

**System.out.println("Produced: " + value);**

**notifyAll();**

**}**

**// Method to consume an item**

**public synchronized int consume() throws InterruptedException {**

**while (queue.isEmpty()) {**

**System.out.println("Buffer is empty. Consumer is waiting...");**

**wait();//System.exit(0);**

**}**

**int value = queue.poll();**

**System.out.println("Consumed: " + value);**

**notifyAll();**

**return value;**

**}**

**}**

**// Class representing a producer**

**class Producer implements Runnable {**

**private final BoundedBufferbuffer;**

**private final int itemsToProduce;**

**public Producer(BoundedBuffer buffer, int itemsToProduce) {**

**this.buffer = buffer;**

**this.itemsToProduce = itemsToProduce;**

**}**

**@Override**

**public void run() {**

**try {**

**for (int value = 0; value <itemsToProduce; value++) {**

**buffer.produce(value);**

**Thread.sleep((int) (Math.random() \* 1000)); // Simulate work**

**}**

**} catch (InterruptedException e) {**

**Thread.currentThread().interrupt();**

**}**

**}**

**}**

**// Class representing a consumer**

**class Consumer implements Runnable {**

**private final BoundedBufferbuffer;**

**private final int itemsToConsume;**

**public Consumer(BoundedBuffer buffer, int itemsToConsume) {**

**this.buffer = buffer;**

**this.itemsToConsume = itemsToConsume;**

**}**

**@Override**

**public void run() {**

**try {**

**for (int i = 0; i<itemsToConsume; i++) {**

**buffer.consume();**

**Thread.sleep((int) (Math.random() \* 1000)); // Simulate work**

**}**

**} catch (InterruptedException e) {**

**Thread.currentThread().interrupt();**

**}**

**}**

**}**

**// Main class to run the producer-consumer example**

**public class ProducerConsumerExample {**

**public static void main(String[] args) {**

**Scanner scanner = new Scanner(System.in);**

**// Get buffer capacity**

**System.out.print("Enter buffer capacity: ");**

**int bufferCapacity = scanner.nextInt();**

**BoundedBuffer buffer = new BoundedBuffer(bufferCapacity);**

**while (true) {**

**// Display menu**

**System.out.println("\nMenu:");**

**System.out.println("1. Produce or Consume");**

**System.out.println("3. Exit");**

**System.out.print("Enter your choice: ");**

**int choice = scanner.nextInt();**

**switch (choice) {**

**case 1:**

**System.out.print("Enter 1 for Producer or 2 for Consumer: ");**

**int subChoice = scanner.nextInt();**

**if (subChoice == 1) {**

**// Producer operation**

**System.out.print("Enter number of items to produce: ");**

**int itemsToProduce = scanner.nextInt();**

**Thread producer = new Thread(new Producer(buffer, itemsToProduce));**

**producer.start();**

**try {**

**producer.join();**

**} catch (InterruptedException e) {**

**Thread.currentThread().interrupt();**

**}**

**} else if (subChoice == 2) {**

**// Consumer operation**

**System.out.print("Enter number of items to consume: ");**

**int itemsToConsume = scanner.nextInt();**

**Thread consumer = new Thread(new Consumer(buffer, itemsToConsume));**

**consumer.start();**

**try {**

**consumer.join();**

**} catch (InterruptedException e) {**

**Thread.currentThread().interrupt();**

**}**

**} else {**

**System.out.println("Invalid choice. Please enter 1 for Producer or 2 for Consumer.");**

**}**

**break;**

**case 3:**

**// Exit operation**

**System.out.println("Exiting...");**

**scanner.close();**

**System.exit(0);**

**break;**

**default:**

**System.out.println("Invalid choice. Please enter 1 or 3.");**

**break;**

**}**

**}**

**}**

**}**

**4.Page table:**

**#include<stdio.h>**

**#include<stdlib.h>**

**int main() {**

**int n = 10;**

**int arr[10];**

**int p;**

**int d;**

**int i;**

**int physicaladd;**

**// Accepting dynamic input for the array**

**printf("Enter 10 values for the array:\n");**

**for(i = 0; i< n; i++) {**

**printf("Enter value for arr[%d]: ", i);**

**scanf("%d", &arr[i]);**

**}**

**while(1) {**

**printf("Enter 1 for PageNo and Displacement \nEnter 2 to exit program \n");**

**scanf("%d", &i);**

**switch(i) {**

**case 1:**

**printf("Enter pageno: ");**

**scanf("%d", &p);**

**if(p < 0 || p >= n) {**

**printf("Invalid pageno. Please enter a value between 0 and 9.\n");**

**break;**

**}**

**printf("Enter displacement: ");**

**scanf("%d", &d);**

**physicaladd = arr[p] + d;**

**printf("The physical address is %d \n", physicaladd);**

**break;**

**case 2:**

**printf("Exiting the program.\n");**

**exit(0);**

**default:**

**printf("Invalid choice. Please enter 1 or 2.\n");**

**}**

**}**

**return 0;**

**}**

**Enter 10 values for the array:**

**Enter value for arr[0]: 1000**

**Enter value for arr[1]: 2000**

**Enter value for arr[2]: 3000**

**Enter value for arr[3]: 4000**

**Enter value for arr[4]: 5000**

**Enter value for arr[5]: 6000**

**Enter value for arr[6]: 7000**

**Enter value for arr[7]: 8000**

**Enter value for arr[8]: 9000**

**Enter value for arr[9]: 10000**

**Enter 1 for PageNo and Displacement**

**Enter 2 to exit program**

**1**

**Enter pageno: 2**

**Enter displacement: 2**

**The physical address is 3002**

**Enter 1 for PageNo and Displacement**

**Enter 2 to exit program**

**2**

**Exiting the program.**

**5.FCFS:**

**#include<stdio.h>**

**#include<stdlib.h>**

**struct Process {**

**int id;**

**int arrival\_time;**

**int burst\_time;**

**int waiting\_time;**

**int turnaround\_time;**

**};**

**int compareProcesses(const void\* a, const void\* b) {**

**struct Process\* process1 = (struct Process\*)a;**

**struct Process\* process2 = (struct Process\*)b;**

**if (process1->arrival\_time != process2->arrival\_time)**

**return process1->arrival\_time - process2->arrival\_time;**

**else**

**return process1->id - process2->id;**

**}**

**// Function to calculate waiting time, turn around time, and draw Gantt chart**

**void calculateAndDraw(int n, struct Process processes[]) {**

**// Sort the processes based on arrival time and process ID**

**qsort(processes, n, sizeof(struct Process), compareProcesses);**

**// Calculate waiting time and turn around time**

**int completion\_time[n], total\_wt = 0, total\_tat = 0;**

**for (int i = 0; i< n; i++) {**

**if (i == 0)**

**completion\_time[i] = processes[i].burst\_time;**

**else**

**completion\_time[i] = completion\_time[i - 1] + processes[i].burst\_time;**

**// Calculate waiting time**

**processes[i].waiting\_time = completion\_time[i] - processes[i].burst\_time - processes[i].arrival\_time;**

**if (processes[i].waiting\_time< 0)**

**processes[i].waiting\_time = 0;**

**total\_wt += processes[i].waiting\_time;**

**// Calculate turn around time**

**processes[i].turnaround\_time = completion\_time[i] - processes[i].arrival\_time;**

**total\_tat += processes[i].turnaround\_time;**

**}**

**// Print Gantt chart**

**printf("\nGantt Chart:\n");**

**printf(" \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");**

**printf("|");**

**for (int i = 0; i< n; i++) {**

**printf(" P%d |", processes[i].id);**

**}**

**printf("\n");**

**printf("|");**

**for (int i = 0; i< n; i++) {**

**printf(" %d |", completion\_time[i]);**

**}**

**printf("\n");**

**// Print WT and TAT for each process**

**printf("\nProcess Burst time Arrival time Waiting time Turnaround time\n");**

**for (int i = 0; i< n; i++) {**

**printf(" %d\t\t%d\t\t%d\t\t%d\t\t%d\n", processes[i].id, processes[i].burst\_time, processes[i].arrival\_time, processes[i].waiting\_time, processes[i].turnaround\_time);**

**}**

**// Print average waiting time and turn around time**

**float avg\_wt = (float)total\_wt / n;**

**float avg\_tat = (float)total\_tat / n;**

**printf("\nAverage Waiting Time: %.2f\n", avg\_wt);**

**printf("Average Turnaround Time: %.2f\n", avg\_tat);**

**}**

**int main() {**

**int n;**

**printf("Enter the number of processes: ");**

**scanf("%d", &n);**

**struct Process processes[n];**

**printf("Enter burst time and arrival time for each process:\n");**

**for (int i = 0; i< n; i++) {**

**printf("Process %d:\n", i + 1);**

**printf("Burst time: ");**

**scanf("%d", &processes[i].burst\_time);**

**printf("Arrival time: ");**

**scanf("%d", &processes[i].arrival\_time);**

**processes[i].id = i + 1;**

**}**

**calculateAndDraw(n, processes);**

**return 0;**

**}**

**Burst time: 3**

**Arrival time: 2**

**Process 3:**

**Burst time: 2**

**Arrival time: 1**

**Process 4:**

**Burst time: 4**

**Arrival time: 1**

**Process 5:**

**Burst time: 2**

**Arrival time: 3**

**Gantt Chart:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**| P1 | P3 | P4 | P2 | P5 |**

**| 5 | 7 | 11 | 14 | 16 |**

**Process Burst time Arrival time Waiting time Turnaround time**

**1 5 0 0 5**

**3 2 1 4 6**

**4 4 1 6 10**

**2 3 2 9 12**

**5 2 3 11 13**

**Average Waiting Time: 6.00**

**Average Turnaround Time: 9.20**

**6.SJF:**

**#include<stdio.h>**

**#include<stdlib.h>**

**#include <limits.h>**

**struct Process {**

**int id;**

**int arrival\_time;**

**int burst\_time;**

**int waiting\_time;**

**int turnaround\_time;**

**};**

**int compareProcesses(const void\* a, const void\* b) {**

**struct Process\* process1 = (struct Process\*)a;**

**struct Process\* process2 = (struct Process\*)b;**

**if (process1->arrival\_time != process2->arrival\_time)**

**return process1->arrival\_time - process2->arrival\_time;**

**else**

**return process1->burst\_time - process2->burst\_time;**

**}**

**void calculateAndDraw(int n, struct Process processes[]) {**

**qsort(processes, n, sizeof(struct Process), compareProcesses);**

**int remaining\_time[n];**

**for (int i = 0; i< n; i++) {**

**remaining\_time[i] = processes[i].burst\_time;**

**}**

**int completion\_time[n];**

**int time = 0;**

**while (1) {**

**int shortest\_burst\_index = -1;**

**int shortest\_burst = INT\_MAX;**

**for (int i = 0; i< n; i++) {**

**if (processes[i].arrival\_time<= time &&remaining\_time[i] <shortest\_burst&&remaining\_time[i] > 0) {**

**shortest\_burst = remaining\_time[i];**

**shortest\_burst\_index = i;**

**}**

**}**

**if (shortest\_burst\_index == -1)**

**break;**

**time += remaining\_time[shortest\_burst\_index];**

**completion\_time[shortest\_burst\_index] = time;**

**remaining\_time[shortest\_burst\_index] = 0;**

**processes[shortest\_burst\_index].waiting\_time = time - processes[shortest\_burst\_index].arrival\_time - processes[shortest\_burst\_index].burst\_time;**

**if (processes[shortest\_burst\_index].waiting\_time< 0)**

**processes[shortest\_burst\_index].waiting\_time = 0;**

**processes[shortest\_burst\_index].turnaround\_time = time - processes[shortest\_burst\_index].arrival\_time;**

**}**

**int total\_wt = 0, total\_tat = 0;**

**for (int i = 0; i< n; i++) {**

**total\_wt += processes[i].waiting\_time;**

**total\_tat += processes[i].turnaround\_time;**

**}**

**printf("\nGantt Chart:\n");**

**printf(" \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");**

**printf("|");**

**for (int i = 0; i< n; i++) {**

**printf(" P%d |", processes[i].id);**

**}**

**printf("\n");**

**printf("|");**

**for (int i = 0; i< n; i++) {**

**printf(" %d |", completion\_time[i]);**

**}**

**printf("\n");**

**printf("\nProcess Burst time Arrival time Waiting time Turnaround time\n");**

**for (int i = 0; i< n; i++) {**

**printf(" %d\t\t%d\t\t%d\t\t%d\t\t%d\n", processes[i].id, processes[i].burst\_time, processes[i].arrival\_time, processes[i].waiting\_time, processes[i].turnaround\_time);**

**}**

**float avg\_wt = (float)total\_wt / n;**

**float avg\_tat = (float)total\_tat / n;**

**printf("\nAverage Waiting Time: %.2f\n", avg\_wt);**

**printf("Average Turnaround Time: %.2f\n", avg\_tat);**

**}**

**int main() {**

**int n;**

**printf("Enter the number of processes: ");**

**scanf("%d", &n);**

**struct Process processes[n];**

**printf("Enter burst time and arrival time for each process:\n");**

**for (int i = 0; i< n; i++) {**

**printf("Process %d:\n", i + 1);**

**printf("Burst time: ");**

**scanf("%d", &processes[i].burst\_time);**

**printf("Arrival time: ");**

**scanf("%d", &processes[i].arrival\_time);**

**processes[i].id = i + 1;**

**}**

**calculateAndDraw(n, processes);**

**return 0;}**

**Burst time: 3**

**Arrival time: 2**

**Process 3:**

**Burst time: 2**

**Arrival time: 1**

**Process 4:**

**Burst time: 4**

**Arrival time: 1**

**Process 5:**

**Burst time: 2**

**Arrival time: 3**

**Gantt Chart:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**| P1 | P3 | P5 | P2 | P4 |**

**| 0 | 5 | 7 | 9 | 12 | 16 |**

**Process Burst time Arrival time Waiting time Turnaround time**

**1 5 0 0 5**

**3 2 1 4 6**

**4 4 1 11 15**

**2 3 2 7 10**

**5 2 3 4 6**

**Average Waiting Time: 5.20**

**Average Turnaround Time: 8.40**

**7.NON PREEMPTIVE:**

**#include <stdio.h>**

**int main() {**

**int n; // Number of Processes**

**printf("Enter the number of processes: ");**

**scanf("%d", &n);**

**int arrivaltime[n], bursttime[n], priority[n], waitingTime[n], turnaroundTime[n];**

**int CPU = 0, allTime = 0;**

**printf("Enter arrival time, burst time, and priority for each process:\n");**

**for (int i = 0; i< n; i++) {**

**printf("For Process %d:\n", i + 1);**

**printf("Arrival Time: ");**

**scanf("%d", &arrivaltime[i]);**

**printf("Burst Time: ");**

**scanf("%d", &bursttime[i]);**

**printf("Priority: ");**

**scanf("%d", &priority[i]);**

**}**

**int ATt[n], PPt[n];**

**int NoP = n;**

**int i = 0;**

**for (i = 0; i< n; i++) {**

**PPt[i] = priority[i];**

**ATt[i] = arrivaltime[i];**

**}**

**int LAT = 0;**

**for (i = 0; i< n; i++)**

**if (arrivaltime[i] > LAT)**

**LAT = arrivaltime[i];**

**int MAX\_P = 0;**

**for (i = 0; i< n; i++)**

**if (PPt[i] > MAX\_P)**

**MAX\_P = PPt[i];**

**int ATi = 0, P1 = PPt[0], P2 = PPt[0];**

**int j = -1;**

**while (NoP> 0 && CPU <= 1000) {**

**for (i = 0; i< n; i++) {**

**if ((ATt[i] <= CPU) && (ATt[i] != (LAT + 10))) {**

**if (PPt[i] != (MAX\_P + 1)) {**

**P2 = PPt[i];**

**j = 1;**

**if (P2 < P1) {**

**j = 1;**

**ATi = i;**

**P1 = PPt[i];**

**P2 = PPt[i];**

**}**

**}**

**}**

**}**

**if (j == -1) {**

**CPU = CPU + 1;**

**continue;**

**} else {**

**waitingTime[ATi] = CPU - ATt[ATi];**

**CPU = CPU + bursttime[ATi];**

**turnaroundTime[ATi] = CPU - ATt[ATi];**

**ATt[ATi] = LAT + 10;**

**j = -1;**

**PPt[ATi] = MAX\_P + 1;**

**ATi = 0;**

**P1 = MAX\_P + 1;**

**P2 = MAX\_P + 1;**

**NoP = NoP - 1;**

**}**

**}**

**printf("\nProcess\_Number\tBurst\_Time\tPriority\tArrival\_Time\tWaiting\_Time\tTurnaround\_Time\n\n");**

**for (i = 0; i< n; i++) {**

**printf("P%d\t\t%d\t\t%d\t\t%d\t\t%d\t\t%d\n", i + 1, bursttime[i], priority[i], arrivaltime[i], waitingTime[i], turnaroundTime[i]);**

**}**

**float AvgWT = 0, AVGTaT = 0;**

**for (i = 0; i< n; i++) {**

**AvgWT = waitingTime[i] + AvgWT;**

**AVGTaT = turnaroundTime[i] + AVGTaT;**

**}**

**printf("Average waiting time = %f\n", AvgWT / n);**

**printf("Average turnaround time = %f\n", AVGTaT / n);**

**return 0;**

**}**

**Arrival Time: 1**

**Burst Time: 2**

**Priority: 3**

**For Process 4:**

**Arrival Time: 1**

**Burst Time: 4**

**Priority: 4**

**For Process 5:**

**Arrival Time: 3**

**Burst Time: 2**

**Priority: 1**

**Process\_Number Burst\_Time Priority Arrival\_Time Waiting\_Time Turnaround\_Time**

**P1 5 2 0 0 5**

**P2 3 1 2 3 6**

**P3 2 3 1 9 11**

**P4 4 4 1 11 15**

**P5 2 1 3 5 7**

**Average waiting time = 5.600000**

**Average turnaround time = 8.800000**

**Gantt Chart:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**| P1 | P2 | P5 | P3 | P4 |**

**| 0 | 5 | 8 | 10 | 12 | 16 |**

**PARENT CHILD PROCESS:**

**Shell program:**

**Largest of three number**

echo "Enter three Integers:"

read a b c

**if** [ **$a** –**gt $b** -a **$a** –**gt $c** ];**then**

echo "$a is Greatest"

**elif** [ **$b** –**gt $c** -a **$b** –**gt $a** ];**then**

echo "$b is Greatest"

**else**

echo "$c is Greatest!"

**fi**

**factorial number**

echo"Enter a number"

read num

fact=1

**while** [ $num –gt 1 ];**do**

fact=**$((**fact \* num**))**#fact = fact \* num

num=**$((**num - **1))**#num = num - 1

**done**

echo $fact

**sum of digits:**

**#!/bin/bash**

echo "Enter a Number:"

read n

**temp**=**$n**

**sd**=0

**sum**=0

**while** [ **$n** -**gt**0 ];**do**

**sd**=$(( **$n** % 10 ))

**n**=$(( **$n** / 10 ))

**sum**=$(( **$sum** + **$sd**  ))

**done**

echo "Sum is $sum"

**reverse a number:**

echo enter n

read n

**num**=0

temp = $n

**while** [ **$temp** –**gt** 0 ];**do**

**num**=$(( **$num** % 10))

**k**=$((k \* 10 + num))

**temp**=$(( **temp/10)**)

**done**

echo “number is” **$k**

**Fibonacci series:**

**#!/bin/bash**

**echo "How many numbers do you want of Fibonacci series ?"**

**read total**

**x=0**

**y=1**

**i=2**

**echo "Fibonacci Series up to $total terms :: "**

**echo "$x"**

**echo "$y"**

**while [ $i -lt $total ]**

**do**

**i=`expr $i + 1 `**

**z=`expr $x + $y `**

**echo "$z"**

**x=$y**

**y=$z**

**done**

**Armstrong number:**

**#!/bin/bash**

**# Function to calculate the power of a number**

**power() {**

**local base=$1**

**local exp=$2**

**local result=1**

**for (( i=0; i<$exp; i++ )); do**

**result=$(( result \* base ))**

**done**

**echo $result**

**}**

**# Function to check if a number is an Armstrong number**

**is\_armstrong() {**

**local num=$1**

**local sum=0**

**local temp=$num**

**local digits=${#num}**

**while [ $temp -gt0 ]; do**

**digit=$(( temp % 10 ))**

**temp=$(( temp / 10 ))**

**sum=$(( sum + $(power $digit $digits) ))**

**done**

**if [ $sum -eq $num ]; then**

**echo "$num is an Armstrong number."**

**else**

**echo "$num is not an Armstrong number."**

**fi**

**}**

**# Check if a number is provided as an argument**

**if [ $# -ne 1 ]; then**

**echo "Usage: $0 <number>"**

**exit 1**

**fi**

**# Assign the argument to a variable**

**number=$1**

**# Check if the provided argument is a positive integer**

**if ! [[ $number =~ ^[0-9]+$ ]]; then**

**echo "Error: Argument must be a positive integer."**

**exit 1**

**fi**

**# Check if the number is an Armstrong number**

**is\_armstrong $number**