**EXPERIMENT – 20**

20. Construct a C program to simulate Reader-Writer problem using Semaphores.

#include <stdio.h>

#include <stdlib.h>

#include <pthread.h>

#include <semaphore.h>

#include <unistd.h>

sem\_t wrt;

pthread\_mutex\_t mutex;

int readCount = 0;

int data = 0;

void\* reader(void\* arg) {

int id = \*(int\*)arg;

while (1) {

pthread\_mutex\_lock(&mutex);

readCount++;

if (readCount == 1) {

sem\_wait(&wrt);

}

pthread\_mutex\_unlock(&mutex);

printf("Reader %d is reading data = %d\n", id, data);

sleep(1);

pthread\_mutex\_lock(&mutex);

readCount--;

if (readCount == 0) {

sem\_post(&wrt);

}

pthread\_mutex\_unlock(&mutex);

sleep(2);

}

return NULL;

}

void\* writer(void\* arg) {

int id = \*(int\*)arg;

while (1) {

sem\_wait(&wrt);

data++;

printf("Writer %d is writing data = %d\n", id, data);

sleep(1);

sem\_post(&wrt);

sleep(3);

}

return NULL;

}

int main() {

pthread\_t rtid[5], wtid[2];

int reader\_ids[5], writer\_ids[2];

sem\_init(&wrt, 0, 1);

pthread\_mutex\_init(&mutex, NULL);

for (int i = 0; i < 5; i++) {

reader\_ids[i] = i + 1;

pthread\_create(&rtid[i], NULL, reader, &reader\_ids[i]);

}

for (int i = 0; i < 2; i++) {

writer\_ids[i] = i + 1;

pthread\_create(&wtid[i], NULL, writer, &writer\_ids[i]);

}

for (int i = 0; i < 5; i++) {

pthread\_join(rtid[i], NULL);

}

for (int i = 0; i < 2; i++) {

pthread\_join(wtid[i], NULL);

}

sem\_destroy(&wrt);

pthread\_mutex\_destroy(&mutex);

return 0;

}

SAMPLE OUTPUT:

Reader 1 is reading data = 0

Reader 2 is reading data = 0

Writer 1 is writing data = 1

Reader 3 is reading data = 1