1. **Producer Consumer problem with n-1 size of the buffer:**

Input:

#include<iostream>

#include<cstdlib>

using namespace std;

int buffersize,buffer[50],s=1,empty,full=0,i,in=0,out=0,mutex=1,next\_produced,next\_consumed,counter=0;

int wait(int s)

 {

    while(s<0)

     {

        cout<<"The buffer is not accessible";

        return 0;

     }

     return s--;

 }

int signal(int s)

 {

    s++;

 }

 int producer()

  {

    empty=wait(empty);

    mutex=wait(mutex);

    if((in+1)%buffersize==out)

     {

        cout<<"\nThe buffer is full. Cannot produce further!";

     }

     else

      {

        cout<<"\nEnter the item to be produced: ";

        cin>>next\_produced;

        buffer[in]=next\_produced;

        in=(in+1)%buffersize;

        cout<<endl<<next\_produced<<" is produced in the buffer successfully"<<endl;

        mutex=signal(mutex);

        full=signal(full);

      }

  }

int consumer()

 {

    full=wait(full);

    mutex=wait(mutex);

    if(in==out)

     {

        cout<<"\nBuffer is empty.Cannot consume any item!";

     }

    else

     {

        next\_consumed=buffer[out];

        cout<<endl<<next\_consumed<<" is the item that is consumed";

        out=(out+1)%buffersize;

        mutex=signal(mutex);

        empty=signal(empty);

     }

 }

int main()

 {

    cout<<"Enter the buffer size: ";

    cin>>buffersize;

    buffer[buffersize];

    empty=buffersize;

    int choice;

    do

        {

                cout<<"\n1.Produce an item\n2.Consume an item\n3.Exit";

                cout<<"\nEnter your choice: ";

                cin>>choice;

                switch (choice)

                 {

                    case 1: producer();

                            break;

                    case 2: consumer();

                            break;

                    case 3: cout<<"\nExiting";

                            exit(0);

                    default: cout<<"\nInvalid input!";

                             break;

                 }

        } while (choice!=3);

    return 0;

 }

Output:

Enter the buffer size: 4

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 10

10 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 20

20 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 30

30 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

The buffer is full. Cannot produce further!

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

10 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

20 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

30 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

Buffer is empty.Cannot consume any item!

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 3

Exiting

1. **Producer Consumer problem with n size of the buffer:**

Input:

#include<iostream>

#include<cstdlib>

using namespace std;

int buffersize,buffer[50],s=1,empty,full=0,i,in=0,out=0,mutex=1,next\_produced,next\_consumed,counter=0;

int wait(int s)

 {

    while(s<0)

     {

        cout<<"The buffer is not accessible";

        return 0;

     }

     return s--;

 }

int signal(int s)

 {

    s++;

 }

 int producer()

  {

    empty=wait(empty);

    mutex=wait(mutex);

    if(counter == buffersize)

     {

        cout<<"\nThe buffer is full.Cannot produce further!";

     }

    else

     {

        cout<<"\nEnter the item to be produced: ";

        cin>>next\_produced;

        cout<<endl<<next\_produced<<" is produced in the buffer successfully"<<endl;

        buffer[in]=next\_produced;

        in=(in+1)%buffersize;

        counter++;

        mutex=signal(mutex);

        full=signal(full);

     }

  }

int consumer()

 {

    full=wait(full);

    mutex=wait(mutex);

    if(counter == 0)

     {

        cout<<"\nThe buffer is empty.Cannot consume further!";

     }

    else

     {

         next\_consumed=buffer[out];

         cout<<endl<<next\_consumed<<" is the item that is consumed";

         out=(out+1)%buffersize;

         counter--;

         mutex=signal(mutex);

         empty=signal(empty);

     }

 }

int main()

 {

    cout<<"Enter the buffer size: ";

    cin>>buffersize;

    buffer[buffersize];

    empty=buffersize;

    int choice;

    do

        {

                cout<<"\n1.Produce an item\n2.Consume an item\n3.Exit";

                cout<<"\nEnter your choice: ";

                cin>>choice;

                switch (choice)

                 {

                    case 1: producer();

                            break;

                    case 2: consumer();

                            break;

                    case 3: cout<<"\nExiting";

                            exit(0);

                    default: cout<<"\nInvalid input!";

                             break;

                 }

        } while (choice!=3);

    return 0;

 }

Output:

Enter the buffer size: 5

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 10

10 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 11

11 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 12

12 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 13

13 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

Enter the item to be produced: 14

14 is produced in the buffer successfully

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 1

The buffer is full.Cannot produce further!

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

10 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

11 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

12 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

13 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

14 is the item that is consumed

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 2

The buffer is empty.Cannot consume further!

1.Produce an item

2.Consume an item

3.Exit

Enter your choice: 3

Exiting