# IPC using Message Queues

A message queue is a linked list of messages stored within the kernel and identified by a message queue identifier. A new queue is created or an existing queue opened by **msgget()**.

New messages are added to the end of a queue by **msgsnd()**. Every message has a positive long integer type field, a non-negative length, and the actual data bytes (corresponding to the length), all of which are specified to msgsnd() when the message is added to a queue. Messages are fetched from a queue by **msgrcv()**. We don't have to fetch the messages in a first-in, first-out order. Instead, we can fetch messages based on their type field.

All processes can exchange information through access to a common system message queue. The sending process places a message (via some (OS) message-passing module) onto a queue which can be read by another process. Each message is given an identification or type so that processes can select the appropriate message. Process must share a common key in order to gain access to the queue in the first place.
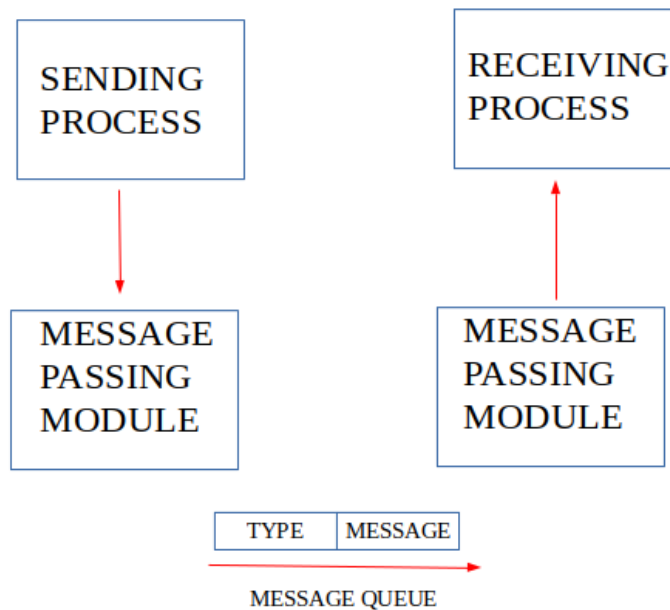
System calls used for message queues:

- **ftok()**: is use to generate a unique key.
- **msgget()**: either returns the message queue identifier for a newly created message queue or returns the identifiers for a queue which exists with the same key value.
- **msgsnd()**: Data is placed on to a message queue by calling msgsnd().
- **msgrcv()**: messages are retrieved from a queue.
- **msgctl()**: It performs various operations on a queue. Generally it is use to destroy message queue.

MESSAGE QUEUE FOR WRITER PROCESS

```c
// C Program for Message Queue (Writer Process)
#include <stdio.h>
#include <sys/ipc.h>
#include <sys/msg.h>
#define MAX 10

// structure for message queue
struct mesg_buffer {
    long mesg_type;
    char mesg_text[100];
} message;

int main()
{
    key_t key;
    int msgid;

    // ftok to generate unique key
    key = ftok("progfile", 65);

    // msgget creates a message queue
    // and returns identifier
    msgid = msgget(key, 0666 | IPC_CREAT);
    message.mesg_type = 1;

    printf("Write Data : ");
    fgets(message.mesg_text,MAX,stdin);

    // msgsnd to send message
    msgsnd(msgid, &message, sizeof(message), 0);

    // display the message
    printf("Data send is : %s \n", message.mesg_text);

    return 0;
}
```

MESSAGE QUEUE FOR READER PROCESS

```c
// C Program for Message Queue (Reader Process)
#include <stdio.h>
#include <sys/ipc.h>
#include <sys/msg.h>

// structure for message queue
struct mesg_buffer {
    long mesg_type;
    char mesg_text[100];
} message;

int main()
{
    key_t key;
    int msgid;

    // ftok to generate unique key
    key = ftok("progfile", 65);

    // msgget creates a message queue
    // and returns identifier
    msgid = msgget(key, 0666 | IPC_CREAT);

    // msgrcv to receive message
    msgrcv(msgid, &message, sizeof(message), 1, 0);

    // display the message
    printf("Data Received is : %s \n",
                    message.mesg_text);

    // to destroy the message queue
    msgctl(msgid, IPC_RMID, NULL);

    return 0;
}
```

Reference: GeekforGeek