

```

mode_t mode; /* access modes */
ulong seq; /* slot usage sequence number */
key_t key; /* key */
};

```

All the fields other than `seq` are initialized when the IPC structure is created. At a later time we can modify the `uid`, `gid`, and `mode` fields, by calling `msgctl`, `semctl`, or `shmctl`. To change these values the calling process must either be the creator of the IPC structure, or it must be the superuser. Changing these fields is similar to calling `chown` or `chmod` for a file.

The values in the `mode` field are similar to the values we saw in Figure 4.4, but there is nothing corresponding to execute permission for any of the IPC structures. Also, whereas message queues and shared memory use the terms `read` and `write`, semaphores use the terms `read` and `alter`. Figure 14.14 specifies the six permissions for each form of IPC.

| Permission | Message queue | Semaphore | Shared memory |
|---------------------|---------------|------------|---------------|
| user-read | MSG_R | SEM_R | SHM_R |
| user-write (alter) | MSG_W | SEM_A | SHM_W |
| group-read | MSG_R >> 3 | SEM_R >> 3 | SHM_R >> 3 |
| group-write (alter) | MSG_W >> 3 | SEM_A >> 3 | SHM_W >> 3 |
| other-read | MSG_R >> 6 | SEM_R >> 6 | SHM_R >> 6 |
| other-write (alter) | MSG_W >> 6 | SEM_A >> 6 | SHM_W >> 6 |

Figure 14.14 System V IPC permissions.

14.6.3 Configuration Limits

All three forms of System V IPC have built-in limits that we may encounter. Most of these can be changed by reconfiguring the kernel. We describe the limits when we describe each of the three forms of IPC.

Under SVR4 these values, and their minimum and maximum values, are in the file `/etc/conf/cf.d/mtune`.

14.6.4 Advantages and Disadvantages

A fundamental problem with System V IPC is that the IPC structures are systemwide and do not have a reference count. For example, if we create a message queue, place some messages on the queue, and then terminate, the message queue and its contents are not deleted. They remain in the system until specifically read or deleted: by some process calling `msgrcv` or `msgctl`, by someone executing the `ipcrm(1)` command, or by the system being rebooted. Compare this with a pipe, which is completely removed when the last process to reference it terminates. With a FIFO, although the name stays in the filesystem until explicitly removed, any data left in a FIFO is removed when the last process to reference the FIFO terminates.