Studio 6 IPC Performance Comparison

1. Members

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2. Answers to the questions

   Basic code:

```
#include <sys/types.h>
#include <sys/socket.h>
#include <sys/stat.h>
#include <sys/un.h>
#include <fcntl.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <errno.h>
#include <unistd.h>
#include <signal.h>

unsigned int times;
char ipc_type[100];

int main (int argc, char *argv[  ]){

   pid_t pid;

   if (argc != 3){
    printf("Program error, reason: %s\n", strerror(errno));
    exit(EXIT_FAILURE);
   }
```

```
    times = atoi(argv[1]);
    strcpy(ipc_type,argv[2]);
    pid = fork();

    if (pid == -1)
    {
      printf("Program error, reason: %s\n", strerror(errno));
      exit(EXIT_FAILURE);
    }
    else if (pid>0)
      printf("It's parent, process times: %d, IPC type: %s\n",
    times, ipc_type);
    else
      printf("It's child, process times: %d, IPC type: %s\n",
  times, ipc_type);

    return 0;
}
```

Output:

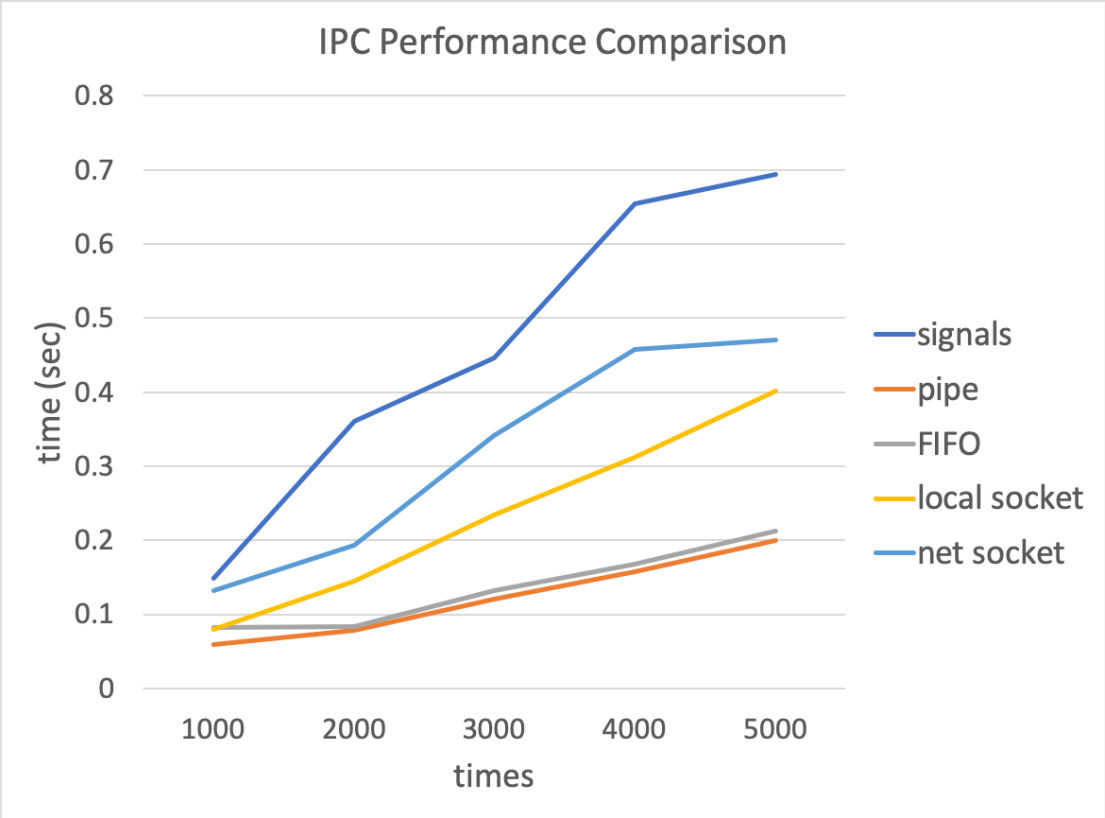
```
pi@raspberrypi-why:~/studio6 $ ./ipc_raw
It's parent, process times: 5000, IPC type: signals
It's child, process times: 5000, IPC type: signals
```

The following results are all under the condition when the ‘times’ is 5000

```
pi@raspberrypi-why:~/studio6 $ ./ipc 5000 signals
It's parent, process times: 5000, IPC type: signals
It's child, process times: 5000, IPC type: signals
SIGUSR2 number is 15956
```

```
time is 0 seconds and 69421615 nanoseconds
pi@raspberrypi-why:~/studio6 $ ./ipc 5000 pipe
It's parent, process times: 5000, IPC type: pipe
It's child, process times: 5000, IPC type: pipe
time is 0 seconds and 20026614 nanoseconds
pi@raspberrypi-why:~/studio6 $ ./ipc 5000 FIFO
Create FIFO Success
It's parent, process times: 5000, IPC type: FIFO
It's child, process times: 5000, IPC type: FIFO
time is 0 seconds and 21264896 nanoseconds
pi@raspberrypi-why:~/studio6 $ ./ipc 5000 lsock
It's parent, process times: 5000, IPC type: lsock
It's child, process times: 5000, IPC type: lsock
time is 0 seconds and 40152500 nanoseconds
pi@raspberrypi-why:~/studio6 $ ./ipc 5000 socket
It's parent, process times: 5000, IPC type: socket
It's child, process times: 5000, IPC type: socket
time is 0 seconds and 47128541 nanoseconds
```

3. Graph



We can see from the graphs and results. The execution time of each IPC increase when communication times increases. Using signals to communicate is the slowest, while pipe is the fastest.

Speed: pipe>FIFO>local socket>signals

As we can see from the results, the parent process has sent much more signals to child than those to be received. This is because it is much easier to send a signal than to receive one.

As the times grow bigger, the growth of execution time of FIFO and pipe is the slower than others. The speed of FIFO and pipe is almost the same.

Note: the unit of the Y-axis should be ‘seconds*10’.