Drew Pulliam – DTP180003

Week 10 Bonus Essay

Reflection on APUE 16.7 and 16.8

APUE 16.7 is about Out-of-band data. This is a feature that some communication protocols use that allows for high-priority messages to be sent. Out-of-band data basically “jumps to the front of the line” and is sent ahead of any other data that is not already mid transmission. TCP supports out-of-band data (and calls it “urgent” data), but not UDP.

TCP “urgent” data only allows one byte to be sent at a time. You can send urgent data using the MSG\_OOB flag. Technically you can send more than one byte and still use this flag, but only the last byte will be treated as actual urgent data. When urgent data is received there is a SIGURG signal.

TCP also supports “urgent mark”. This is the point in a data stream where urgent data goes. Using this we can send data and specify a specific byte to be urgent (not always the last byte like the default). To do this use the SO\_OOBINLINE socket option.

APUE 16.8 is about nonblocking and asynchronous I/O. There are several functions that can be blocked normally, such as recv and send. These functions cannot be blocked when the socket is in nonblocking mode. In nonblocking mode these functions will instead simply fail instead of blocking. They will also set errno to EWOULDBLOCK to show that they would normally be blocked but can not because the socket is in nonblocking mode.

There is a general support for asynchronous I/O using the Single UNIX specification, and also a separate non-standardized method using the socket mechanism. Socket-based asynchronous I/O can arrange to send a SIGIO signal when ready to read data or when space is open in write queue.

There are two steps to enable asynchronous I/O. First step is to establish socket ownership. Second is to tell the socket to signal when I/O operations won’t block. There are several ways to get socket ownership, one of which is to use F\_SETOWN command. To inform the socket to signal correctly we can use the FIOASYNC command.