

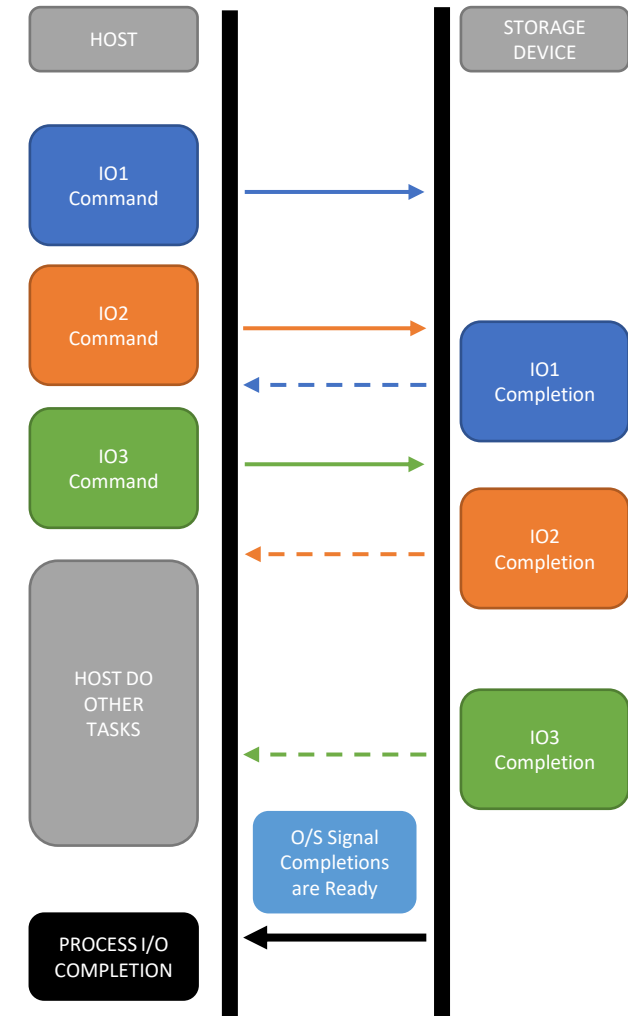
What is Asynchronous I/O?

Asynchronous (ASYNC) I/O is a type of I/O handshake that occurs between the host and storage device, also known as non-blocking I/O.

With ASYNC I/O, the host does not have to wait for the I/O completion after sending the I/O request. Instead, the host can continue with other tasks and inspect the I/O completion when the operating system signals that it is ready. This allows the host to queue many I/O requests on the storage device at the same time. Referencing the picture on the right, the host submits three I/O requests and performs other tasks until the operating system signals that the I/O completions are ready for processing.

There are two modes associated with ASYNC I/O – burst and sustained. In burst mode, when I/O requests are submitted to the storage device, the host waits for all I/O completions to finish, afterwards, the host submits a new round of I/O requests, and the cycle is repeated. In sustain mode, the host always maintains a constant number of pending I/O requests on the storage device. I/O completions are processed independently, and the host will submit new I/O requests as needed to maintain a predetermined number of outstanding I/O requests on the storage device.

Referencing the diagrams, burst can be represented as a sinusoidal function, and sustained as a constant function of time.



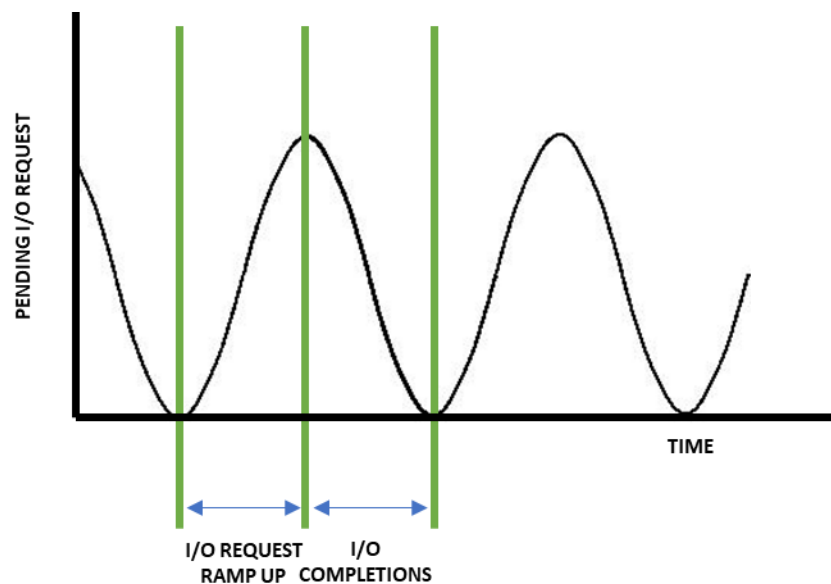


The burst mode function shows a gradual increase in pending I/O requests until a maximum is reached, the host then stops creating I/O requests, and waits for the storage device to perform I/O completions on all pending. When all I/O completions are received, the host generates a new burst of I/O requests, and the process repeats.

The sustain mode function shows a gradual build up to maximum I/O requests like burst mode, but in this case, there will always be maximum number of I/O requests pending on the storage device. The host will replace each I/O completion as they occur with a new I/O request to always maintain this maximum number.

Popular open-source performance tools like IoMeter perform sustain type asynchronous I/O.

Burst



Sustain

