

# Blocking Operations

This page tracks which blocking operations release the underlying thread to do other work. It's for reference purposes. Developers using the Java APIs should not be concerned with any of the details here, it's transparent and will be unspecified as to which APIs are scheduling points.

The following blocking operations are "virtual thread friendly". When not pinned, they will release the underlying carrier thread to do other work when the operation blocks.

API	Method(s)	Notes
java.lang.Thread	sleep, join	join to wait for a virtual thread to terminate
java.lang.Process	waitFor	Linux/macOS only
java.util.concurrent	All blocking operations	
java.net.Socket	connect, read, write	Socket constructors with a host name parameter may need to do a lookup with InetAddress, see below
java.net.ServerSocket	accept	
java.net.DatagramSocket /MulticastSocket	receive	connect, disconnect and send do not block
java.nio.channels.SocketChannel	connect, read, write	
java.nio.channels.ServerSocketChannel	accept	
java.nio.channels.DatagramChannel	read, receive	connect, disconnect, send, and write do not block
java.nio.channels.Pipe.SourceChannel	read	
java.nio.channels.Pipe.SinkChannel	write	
Console streams (System.in, out, err)	read, write, printf	Linux/macOS only

The following blocking operations use the *ForkJoinPool.ManagedBlocker* mechanism when invoked from a virtual thread. Parallelism is temporarily expanded until the blocking operation completes.

API	Method(s)	Notes
java.lang.Object	wait	
java.lang.Process	waitFor	Windows only
java.io.File	All file I/O operations	
java.io.FileInputStream	open, read, skip	
java.io.FileOutputStream	open, write	
java.io.RandomAccessFile	open, read, write, seek	
java.net.InetAddress	All lookup operations	InetAddress SPI in the works that will allow deploying a virtual thread friendly name resolver
java.nio.MappedByteBuffer	force	
java.nio.channels.Selector	All blocking selection operations	
java.nio.channels.FileChannel	read, write, lock, truncate, force, transferTo	
java.nio.file	All file I/O operations	

The following are some of the blocking operations that use the *ForkJoinPool.ManagedBlocker* mechanism *by way* of the operations in the previous table.

API	Method(s)	Notes
java.lang.Thread	join	join to wait for a kernel thread to terminate
java.lang.Process	All operations on the input/output/error streams	
Console streams (System.in, out, err)	read, write, printf	Windows only
java.io.Console	All read, format, printf operations	