HOMEWORK 1

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Question 1.

(1) The process is interrupted
(2) The process is scheduled to run
(3) N/A
(4) The process finishes an I/O or device operation
(5) N/A
(6) The process requests an I/O or device operation

Question 2.

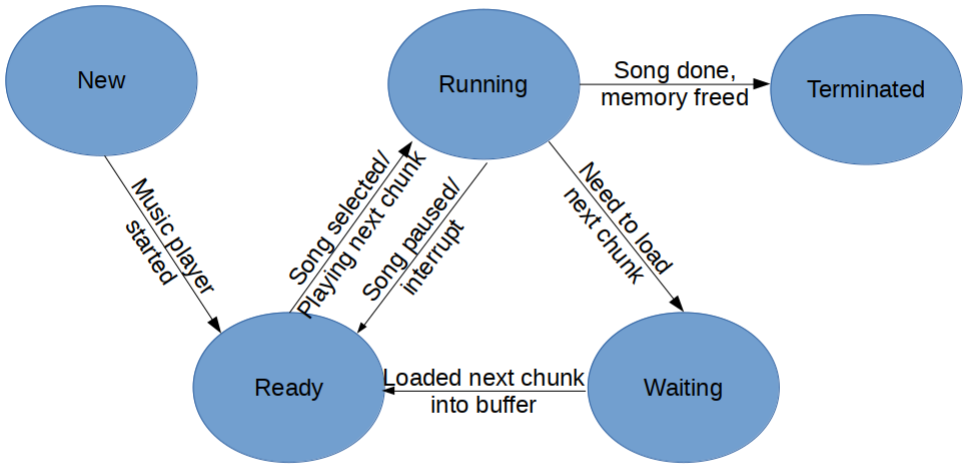
(1) Ready
(2) Running
(3) User
(4) Blocked
(5) Kernel
(6) Yes
(7) Ready
(8) Blocked
(9) Ready
(10) Running, User
(11) Running, Ready
(12) Ready, Running
(13) Kernel
(14) Ready
(15) User
(16) Ready

Question 3. Consider a situation where a user is listening to music on a computer, phone, or media player. The entire song need not be loaded into memory for the whole listening duration; since the audio plays back at a constant rate of 44.1 thousand samples per second, we can chunk playback every several seconds, and we only need to load a single chunk at a time. Therefore, while listening to a song, several I/O operations need to take place. This process is called buffering, and every chunk is loaded into a fixed size buffer in memory.

The following state transitions are observed:

- New to Ready: the music player is opened, awaiting song selection
- Ready to Running: a song is selected to play (first time), or the next chunk is being played (all other occurrences)
- Running to Ready: the song is paused or playback is otherwise interrupted
- Running to Waiting: the next chunk of audio must be loaded from disk
- Waiting to Ready: the next chunk has successfully been loaded into the buffer
- Running to Terminated: Song playback is finished and the music player is closed

FIGURE 1. Process State Diagram



The state transitions are summarized in graphical form in figure 1. We can see that "Running" represents playback via the sound card, "Ready" indicates that audio is on standby, and "Waiting" shows that disk streaming is being performed.